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ACIDITY-REDUCTION IN CREAM FOR BUTTER-MAKING.

THE USE OF BICARBONATE OF SODA.

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THE reduction of acidity in cream by means of neutralizers was first practised in New Zealand dairy factories after the introduction of the home-separation system of buttermaking. Under the whole-milk system pasteurization had not been generally adopted, but the less frequent deliveries under home separation produced a cream of much poorer quality and higher acidity. It was soon evident that if a high-grade butter was to be made pasteurization was a necessity, and the difficulty of dealing with very sour cream presented itself. The use of an alkali to reduce the acidity of the cream was the next step, and after numerous experiments with lime, carbonate of soda, bicarbonate of soda, mixtures of these, &c., bicarbonate of soda was almost generally adopted. It has many advantages: it is cheap, mild in its action, and is in common use as an ingredient of other food products; but it must be used with discretion, or a strong soda flavour will be imparted to the butter. For the sake of simplicity bicarbonate of soda is hereafter in this article termed "soda."

Cream which has been separated from milk at a skimming-station will show from 0·1 to 0·15 per cent. of acidity. Home-separated cream received daily may run from 0·13 to 0·2 per cent. of acid if handled with reasonable care. Experience has shown that a more uniform quality of butter can be made from such cream by means of pasteurization, and no difficulties will be experienced in putting it

through the machines without the addition of a neutralizer, though in actual practice in New Zealand to-day nearly all cream is partially neutralized.

Sour cream can be pasteurized, but the loss of fat in the buttermilk is considerable, while difficulty will be experienced by curdling, and through the casein burning on the pasteurizer. Moreover, the quality of the butter will be irregular, and, owing to the high acidity, liable to develop "fishiness." Hence the necessity for partial neutralization. On the other hand, the addition of soda solution does not reduce the acidity more than 0·02 or 0·03 per cent. until heat is applied; consequently pasteurization becomes a necessity if high-grade butter of uniform quality is to be made from cream of this class.

The object of partial neutralization of sour cream, then, is to reduce the acidity to the point when the pasteurization process as used with sweet cream may be successfully applied. It should be noted here, however, that such neutralization will not make a clean-flavoured sound-keeping butter from cream in which the acid has developed to the point of staleness, fermentation, rancidity, &c., or which has defects such as feed, dirty milking-machine, or other off-flavours of similar character.

On uniformity of acidity and temperature will depend the success or otherwise of the work done. The whole of the cream treated must be subjected to the same temperature, as a drop in the temperature of the pasteurizer will result in less complete combination between the soda and the lactic acid. Excess of soda in one vat will not compensate for a deficiency in another, even though the cream in the cooling-vats may show the acidity aimed at, for practically the whole of the neutralizing effect takes place in the pasteurizer. If the amount of soda required is only guessed at, a test cannot be made nor any error corrected until a certain quantity of cream has passed through the pasteurizer. This in a large factory, possibly with two pasteurizers and a regenerator, may be quite sufficient to spoil the day's make. When using a neutralizer the tendency is to add too much, and, instead of partial neutralization, the inclination is to make the cream quite neutral, or even to add an excess of soda, which doubtless is the cause of the complaints of neutralizer or preservative flavour so frequently heard of late.

Most factory-managers can recall days on which it seemed impossible to bring down the acidity of the cream, and the more soda was added the higher the acidity rose. Thus, if it was desired to reduce 100 gallons of cream which showed 0·4 per cent. of acid in the receiving-vat to 0·1 per cent. leaving the pasteurizer, 2·5 lb. of soda would be required; but if 4 lb. of soda were added the acidimeter-reading might be 0·15; while if still more soda were added the acidity of the cream would possibly rise to 0·2 instead of being reduced. This was due to the fact that if too much soda is added to the cream the acidimeter-readings are quite unreliable.

A rise in the acidimeter-reading as the result of the presence of too much alkali seems to be contrary to all reason, but experience has shown this to be the case, and any one wishing to satisfy himself on this point can do so in the following manner: Take some cream which has been neutralized to 0·15 (correct reading) and add a pinch of soda. Warm the cream over the spirit-lamp, and then test it for acid. Continue to add soda in small quantities, heating and

testing for acid, and it will be found that the acidimeter-readings gradually fall; then as the amount of soda present becomes excessive they will rise again to over 0·2 per cent. Now take some sour cream to which no soda has been added, and add a little at a time to the cream containing the excess of soda. Heat and test as before, and the acidimeter-readings will gradually fall and then rise again.

The presence of too much soda can be detected by a bitter taste in the pasteurized cream, by the pasteurizer boiling over, by the appearance of innumerable small bubbles in the cream passing over the cooler, or by the formation of a pink ring immediately the indicator is dropped into the sample to be tested. If the excess is slight this ring will disappear when the cup is shaken, but if the excess of soda is considerable the pink colour will remain permanent without the addition of any alkaline solution.

In order to maintain an even percentage of acidity in the pasteurized cream it is necessary to have two receiving-vats, or one vat divided into two sections. Cases can be quoted where good work has been done with only one vat, but it is much more difficult to keep the acidity uniform, and there is more danger of using an excess of soda. Round-bottomed neutralizing-vats similar in shape to the ordinary expansion cream-vat will be found most suitable. Their shape makes the mixing of the cream for sampling and the mixing of the soda solution into the cream much easier. Where the height of the receiving-platform allows one vat to be placed above another the top one can be used for neutralizing, and the drop from it to the bottom one will thoroughly mix the cream and soda solution. Experience has shown it to be good practice to have these vats of such size that they will be emptied in about thirty minutes.

A good plan is to fill the receiving-vat to a mark a few inches below the top, the quantity which it holds to that point having been previously ascertained. This will allow room for the cream to swell after the soda is added. Thoroughly stir the cream, so that a representative sample can be taken, and then test for acidity. Assuming that the acidity is 0·5, and it is desired to reduce it to 0·1, the following calculation will give the amount of soda required for a vat of 1,500 lb. of cream. Subtract the degree of acidity desired—namely, 0·1—from the acidity reading of the cream in the vat (that is 0·5 per cent.), and we have 0·4 per cent. of acidity to be taken out, proceeding thus—

$$\frac{1{,}500 \times 0{\cdot}40 \times 1}{1{,}000 \times 0{\cdot}12} = 5 \text{ lb. of soda required.}$$

The table on the next page gives the amount of soda required to reduce practically any quantity of cream any number of points. It is not claimed that it is correct under all conditions, this being chiefly owing to the variation in the strength of soda, but it is so close that if used in conjunction with the acidimeter no overdosing with soda is likely.

Careful experiment with cream ranging from 0·2 to 0·7 per cent. of acidity has shown that 1 lb. of Crescent brand soda (the brand most commonly used) will reduce the acidity of 1,000 lb. of cream 0·12 per cent., and the table has been calculated from these figures. The first column in the table represents the number of pounds of cream to be utilized. *The top line is the percentage of acidity to be taken out of the cream, not the acidity of the cream in the vat.* To find the number

Acidity-reduction Table for Cream.

Pounds of Cream.	Percentage of Reduction desired.												
	0·10	0·11	0·12	0·13	0·14	0·15	0·16	0·17	0·18	0·19	0·20	0·22	0·24
	Pounds of Bicarbonate of Soda required.												
500 ..	0·41	0·46	0·50	0·54	0·58	0·62	0·66	0·70	0·75	0·79	0·83	0·92	1·00
600 ..	0·50	0·55	0·60	0·65	0·70	0·75	0·80	0·85	0·90	0·95	1·00	1·10	1·20
700 ..	0·58	0·64	0·70	0·75	0·81	0·87	0·93	0·99	1·05	1·10	1·16	1·28	1·40
800 ..	0·66	0·73	0·80	0·86	0·93	1·00	1·06	1·13	1·20	1·26	1·33	1·46	1·60
900 ..	0·75	0·82	0·90	0·97	1·05	1·12	1·20	1·27	1·35	1·42	1·50	1·64	1·80
1,000 ..	0·83	0·91	1·00	1·08	1·16	1·25	1·33	1·41	1·50	1·58	1·66	1·83	2·00
1,100 ..	0·91	1·00	1·10	1·19	1·28	1·37	1·46	1·55	1·65	1·74	1·83	2·00	2·20
1,200 ..	1·00	1·10	1·20	1·30	1·40	1·50	1·60	1·70	1·80	1·90	2·00	2·20	2·40
1,300 ..	1·08	1·19	1·30	1·40	1·51	1·62	1·73	1·84	1·95	2·05	2·16	2·38	2·60
1,400 ..	1·16	1·28	1·40	1·51	1·63	1·75	1·86	1·98	2·10	2·21	2·33	2·56	2·80
1,500 ..	1·25	1·37	1·50	1·62	1·75	1·87	2·00	2·12	2·25	2·37	2·50	2·74	3·00
1,600 ..	1·33	1·46	1·60	1·73	1·86	2·00	2·13	2·26	2·40	2·53	2·66	2·92	3·20
1,700 ..	1·41	1·55	1·70	1·84	1·98	2·12	2·26	2·40	2·55	2·69	2·83	3·11	3·40
1,800 ..	1·50	1·65	1·80	1·95	2·10	2·25	2·40	2·55	2·70	2·85	3·00	3·30	3·60
1,900 ..	1·58	1·74	1·90	2·06	2·21	2·37	2·53	2·69	2·85	3·00	3·16	3·58	3·80
2,000 ..	1·66	1·83	2·00	2·17	2·33	2·50	2·66	2·83	3·00	3·16	3·33	3·66	4·00
3,000 ..	2·50	2·75	3·00	3·25	3·50	3·75	4·00	4·25	4·50	4·75	5·00	5·50	6·00
4,000 ..	3·33	3·66	4·00	4·33	4·66	5·00	5·33	5·66	6·00	6·33	6·66	7·33	8·00
5,000 ..	4·16	4·58	5·00	5·41	5·83	6·25	6·66	7·08	7·50	7·91	8·33	9·16	10·00

Pounds of Cream.	Percentage of Reduction desired.												
	0·26	0·28	0·30	0·32	0·34	0·36	0·38	0·40	0·42	0·44	0·46	0·48	0·50
	Pounds of Bicarbonate of Soda required.												
500 ..	1·08	1·16	1·24	1·33	1·41	1·50	1·58	1·66	1·75	1·84	1·91	2·00	2·08
600 ..	1·30	1·40	1·50	1·60	1·70	1·80	1·90	2·00	2·10	2·20	2·30	2·40	2·50
700 ..	1·51	1·62	1·74	1·86	1·98	2·10	2·21	2·33	2·45	2·56	2·68	2·80	2·91
800 ..	1·72	1·86	2·00	2·12	2·26	2·40	2·52	2·66	2·80	2·92	3·06	3·20	3·33
900 ..	1·95	2·10	2·25	2·40	2·55	2·70	2·84	3·00	3·15	3·28	3·45	3·60	3·75
1,000 ..	2·16	2·32	2·50	2·66	2·83	3·00	3·16	3·32	3·50	3·64	3·83	4·00	4·16
1,100 ..	2·38	2·56	2·75	2·92	3·11	3·30	3·48	3·66	3·85	4·03	4·20	4·40	4·58
1,200 ..	2·60	2·80	3·00	3·20	3·40	3·60	3·80	4·00	4·20	4·40	4·60	4·80	5·00
1,300 ..	2·80	3·02	3·25	3·46	3·68	3·90	4·11	4·32	4·55	4·76	4·98	5·20	5·41
1,400 ..	3·03	3·26	3·50	3·73	3·98	4·20	4·42	4·66	4·90	5·12	5·36	5·60	5·83
1,500 ..	3·25	3·50	3·75	4·00	4·25	4·50	4·75	5·00	5·25	5·50	5·75	6·00	6·25
1,600 ..	3·46	3·72	4·00	4·26	4·52	4·80	5·06	5·32	5·60	5·86	6·13	6·40	6·66
1,700 ..	3·68	3·96	4·25	4·52	4·81	5·10	5·38	5·66	5·95	6·23	6·51	6·80	7·08
1,800 ..	3·90	4·20	4·50	4·80	5·10	5·40	5·70	6·00	6·30	6·60	6·90	7·20	7·50
1,900 ..	4·11	4·43	4·75	5·06	5·38	5·70	6·01	6·33	6·65	6·96	7·28	7·60	7·91
2,000 ..	4·33	4·66	5·00	5·33	5·66	6·00	6·32	6·66	7·00	7·32	7·66	8·00	8·33
3,000 ..	6·50	7·00	7·50	8·00	8·50	9·00	9·50	10·00	10·50	11·00	11·50	12·00	12·50
4,000 ..	8·66	9·33	10·00	10·66	11·32	12·00	12·66	13·33	14·00	14·66	15·33	16·00	16·66
5,000 ..	10·83	11·66	12·50	13·32	14·16	15·00	15·83	16·66	17·50	18·32	19·16	20·00	20·83

of pounds of soda required, subtract the acidity desired from the acidity of the cream in the receiving-vat, then follow along the line opposite the number of pounds of cream in the vat until the column under the percentage of acidity to be taken out is reached. For example, as already shown, the reduction of 1,500 lb. of cream from 0·5 to 0·1 will require 5 lb. of soda.

With vats having a holding-capacity which is a multiple of twelve the calculation of the soda required is simple. Since 1 lb. of soda reduces the acidity of 1,000 lb. of cream 0·12 per cent., 1 lb. of soda will reduce the acidity of 1,200 lb. of cream 0·1 per cent. Therefore, by subtracting the acidity desired from the acidity of the cream in the vat the number of pounds of soda required for 1,200 lb. of cream will be found by multiplying this difference by ten.

Example.

Cream in Vat.	Acidity of Cream.	Acidity desired.	Calculation.	Soda required.
lb.	Per Cent.	Per Cent.		lb.
1,200	0·50	0·10	0·5 − 0·1	4·0
1,200	0·43	0·06	0·43 − 0·06	3·7
2,400	0·50	0·10	0·5 − 0·1 × 2	8·0
3,600	0·43	0·06	0·43 − 0·06 × 3	11·1

Unless care is taken the acidity-reduction table will not be of much value. The quantity of cream must be known to a few pounds. It must be thoroughly mixed so that the sample tested is representative of the whole. The test should be properly made, and the soda weighed correctly and completely dissolved. The soda solution must be carefully stirred into the cream. To get the weight of cream correct, add up the suppliers' dockets as the cream is being weighed in, and put a mark on the vat for each 100 lb. added. For mixing, nothing is better than a wooden plunger with a big head, or a wooden paddle. Metal plungers knock the tin off the vat.

The practice of adding so many pounds or measures of soda to each vat without having first tested for acidity is quite wrong, as the variation from one vat to another, and from day to day, is too great to give accurate results. A number of factories to-day reduce the acidity of the cream below 0·1, and not infrequently 0·05 or less is the point aimed at. For example, taking 1,500 lb. of cream as before, and 0·5 as the acidity of the cream when received, $5\frac{1}{2}$ lb. of soda will be required to reduce it to 0·05. To reduce the whole of the acidity in the cream to neutral, only $6\frac{1}{4}$ lb. of soda would be required. Hence the necessity for accurate weighing. For this purpose a spring balance should be provided and used.

When testing sour cream for acidity greater care is necessary than when testing milk or whey, owing to cream being much thicker. Always rinse the pipette with water (the quantity does not matter) to remove the portion adhering to the inside, otherwise a low-acidity reading will result, and consequently a wrong calculation of the amount of soda required This is one of the causes of the common impression that very sour cream requires more soda in proportion than cream which is comparatively low in acid.

Equal care in sampling is necessary to get correct results after the cream has passed through the pasteurizer, owing to the presence of bubbles at this stage. For this reason it is best to catch some cream in a mug, preferably from the last cooler, and allow it to stand a moment before drawing the sample.

A common mistake among buttermakers when making the test for acidity is to work to a shade of pink which is too deep. As laid down in the Department's Bulletin No. 10, "The Acidimeter and its Use," the reading should be taken immediately the pink colour shows an inclination to remain permanent. In point of fact, the mixture at this stage is slightly alkaline, since the phenolphthalien indicator shows pink in the presence of an alkali. If the shade of pink is carried to the point where 0·5 cream is read as 0·52 the result will be that $\frac{1}{4}$ lb. more soda will apparently be required to every 1,500 lb. of cream. But if the same shade is used in testing for acidity subsequent to pasteurization, cream which is actually neutral may show 0·05 of acid.

With a good indicator two drops should be quite sufficient, and when the first of the alkaline solution is dropped into the cream after the indicator has been added it should show a deep pink before being shaken. If the pink at this stage is pale and undecided the indicator is weak and unreliable, and should be replaced. A drop or two extra will not affect the result, provided the cup is thoroughly shaken, but the pink colour will show more rapidly. Poor indicator will be liable to give a high reading, as more alkaline solution than necessary will have to be added to produce the pink colour. One of the causes of defective indicator is acidity in the alcohol in which the phenolphthalien is dissolved. To correct this defect make a strong solution of caustic soda and water, and drop it into the indicator, one drop at a time, until a slightly pink shade of colour is produced.

To secure accurate results it is necessary to thoroughly dissolve the soda, and since it is practically impossible to do so with cold water it is best to use water at a temperature of about 120° F. The impression is common among factory-managers that the soda is not so strong when dissolved in warm water, but this is not correct. Water so hot that it causes the soda to effervesce is not desirable. A mixture of soda and water in which the soda is held in suspension but not dissolved is not satisfactory, and the small lumps of soda will be found undissolved on the bottom of the vat when it is emptied. Soda solution may be prepared ready for use by dissolving 1 lb. of soda in 9 lb. water: 10 lb. of the solution can then be used instead of 1 lb. of dry soda. In many ways this is more convenient, and time can be taken to see that the soda is thoroughly dissolved. It is best to keep the solution in a wooden barrel, as it attacks any metal vessel and gets a metallic taste. For the same reason a wooden bucket is better than a metal one for dissolving the soda.

Finally, every care should be taken to thoroughly mix the soda solution and the cream in the neutralizing-vats. Here again very thick, sour cream will present the greatest difficulty, and to ensure correct results at least 1 gallon of water to 1 lb. of soda should be used when each lot is being prepared as required. If the cream is very thick this amount of water can be doubled or trebled with advantage.

All final acidimeter-readings of neutralized cream here mentioned were taken as the cream left the pasteurizer after being treated to 200° F. or over, the pasteurizing temperature having a direct influence on the amount of soda required. It has already been stated that there is very little chemical action between the soda and the lactic acid present in the cream until heat is applied. The acidity of the cold cream in the receiving-vats is only reduced a few degrees when the soda is added. If for any reason the pasteurizing cannot be proceeded with for a number of hours after the soda is added it will be found necessary to add nearly as much soda as was used in the first instance, in order to make the desired reduction in the acid when the pasteurizer is started later on. The completeness of the chemical combination between the soda and the lactic acid depends to a great extent on the pasteurizing temperatures. Cream which has been overneutralized may go through the first pasteurizer without showing any indication of excess soda, but on reaching the second and coming into contact with the higher temperature it may "boil over," indicating that the increased heat has stimulated the chemical action between the lactic acid and the soda. Where cream containing 0·4 per cent. or more of acid is being treated under the two-stage system of continuous pasteurization, and the temperature is raised to 170°–180° in the first pasteurizer and to 200° in the second, an acid test from the first machine may show 0·15 per cent. of acid, while the same cream after passing through the second machine shows only 0·08 per cent. If the temperature of the first machine is raised to 190° the difference will probably be only 0·03 or 0·04 per cent. For this reason the fairly general practice of high pasteurizing temperatures for the treatment of partially neutralized cream of high acidity may be accepted as sound.

When treating comparatively sweet cream of about 0·25 per cent. of acid there will not be the same difference between the acidity of the first and second pasteurizers. In other words, the soda acts more freely at the lower pasteurizing temperatures when only a small quantity is required to bring the acidity of the cream down to a certain point. At a temperature of 175° on the first machine and 200° on the second there will be a difference of about 0·04 in the acidity, and if the temperature of the first machine is raised to 190° it will be a point or two less. The difference in the acidity of the two pasteurizers will be greatest with all classes of cream when a very low percentage of acid in the neutralized cream is aimed at.

This goes to show that when pasteurizing sour cream at comparatively low temperatures a certain amount of the soda is not made use of; further, that if the full neutralizing effect of the soda used is to be secured very high pasteurizing temperatures are necessary when treating very sour cream, more especially where a low percentage of acid is aimed at; and lastly, that if a very low neutralizing-point is not aimed at with comparatively sweet cream a high pasteurizing temperature is not necessary to get the full effect of the soda used.

The use of a neutralizer is only necessary owing to defects in the cream, and, as the risks attending its use increase as the quality of the cream gets poorer, an improvement in the quality of the latter should be the aim of every one connected with the butter industry.

While neutralization has undoubtedly done a great deal to improve the quality of the butter made from home-separated cream, it is an open question whether this improvement has not been taken advantage of to accept cream which was not the best that the dairyman was capable of supplying. Further, it is probable in many cases that the greatest improvement possible from acidity-reduction has not been obtained owing to the very common fault of overneutralization. The tenth normal alkaline method of testing for acidity may not be scientifically correct as a test for acid in cream, but commercially it is quite satisfactory. Whether it will show the acidity correctly in cream neutralized to 0·05 per cent. and under is doubtful, since it is possible to get a reading of 0·05 per cent. in cream which is obviously overneutralized, and still get the same reading after a good deal more sour cream has been added to the receiving-vat. Keeping in mind the fact that the acidimeter will not give a correct reading when cream is overneutralized, it is obvious that if a low acidity is aimed at the most careful calculation of the acidity to be removed must be made, since no reliable check-test can be made after the cream has passed through the pasteurizer.

It is also doubtful whether butter can be made from cream which has been neutralized with soda without showing traces of soda. The test for soda in butter is as follows: Weigh out 10 grammes of butter; melt in 100 cc. of warm water; allow mixture to stand five minutes; draw off water into an aluminium mug; add 2 cc. of phenolphthalien indicator which is free from acid; boil over a lamp till a pink colour appears; neutralize the pink colour by dropping in standard acid, as used for testing alkaline solution, from a burette marked to $\frac{1}{20}$ cc.; keep on boiling and adding standard acid till no more colour appears. Note the amount of acid required to reduce the pink colour, and multiply by 0·084. This gives the amount of soda in the butter. Thus, if the acidimeter-reading is 0·25—that is, $\frac{5}{20}$—the soda content of the butter will be $0·25 \times 0·084 = 0·021$ per cent. This test will not give correct results with butter containing preservative other than pure boracic acid.

Before starting to make the test one should make sure that the water and vessels to be used contain no alkali. Fill the mugs with water, add the indicator, and boil. If no pink colour shows, test the water for acidity by dropping in alkaline solution. Condensed water from a steam-valve or from the exhaust of the pasteurizer, if free from oil, will usually be found quite suitable. If no 100 cc. measure is available, six 17·6 cc. pipettes full will be fairly correct, and when removing the watery fluid five pipettes can be drawn without disturbing the fat if no separatory funnel is on hand. Use the factor 0·095 in this case.

If the cream from which the butter was made has been over-neutralized, a strong pink colour will show as soon as the indicator is added to the watery fluid. If it does not do so the solution should be boiled. So far the writer has not tested one sample of butter made from soda-neutralized cream which, out of a large number of samples tested, did not show a soda reaction. Just where the line of distinction showing overneutralized butter can be drawn has not yet been determined, but sufficient has been ascertained to indicate that such a line can be fixed, provided the butter contains no preservative or pure boracic acid only.

GOATS AND BLACKBERRY-CONTROL ON HILL COUNTRY.

NOTES ON MANAGEMENT IN WAIMEA COUNTY.

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GOATS have been farmed in Waimea County (Nelson District), solely for use in the control of blackberry, since 1906. The results obtained by their owners have clearly demonstrated that at present these animals are the most economical agents known for combating the pest. The farm of Mr. L. Higgins, Belgrove, is an excellent example of their efficiency. Prior to 1906 the late Mr. P. Higgins, who then owned this farm, employed every year two men for about six weeks to cut

FIG. 1. ANGORA GOATS AMONG BLACKBERRY ON MR. L. A. HIGGINS'S FARM, BELGROVE.

blackberry on a 500-acre block. He then purchased a hundred goats, and this flock has been maintained ever since on the area. Since 1906 the blackberry has never been cut, and, in fact, is no longer a menace. The same excellent results have been obtained by other owners throughout the country.

THE ANGORA BREED.

The goats used in Waimea County are as near purebred Angora as can be obtained. The advantages of this breed may be stated as follows: (1.) The average Angora will clip about 5 lb. of wool, which brings approximately the same price as crossbred-sheep wool. (2.) It is, if anything, a more herbaceous-feeding animal than the crossbred. Disadvantages of the Angora are: (1.) The hoggets, owing to their long wool and light frame, are liable to get entangled, resulting in a higher death-rate. (2.) The nannies are more sensitive, and if disturbed immediately after kidding will leave the kid and seldom return. The latter observation applies more or less to all nannies,

and owners should be careful not to disturb them until the kids are at least a week old.

Angoras begin to shed their wool early in spring, and therefore must be shorn then to save loss. On this account they cannot be shorn in cold countries.

BREEDING PRACTICE.

One billy will serve about forty nannies. It is not wise to have too many billies, as they are apt to injure nanny hoggets. To get the best results, billies should be used in exactly the same manner as rams—that is, they should be isolated, and put out with the flock not earlier than May. The gestation period for goats is about 156 days, and care should be taken to ensure that kidding takes place not earlier than September, as young kids do not stand up to the cold well. If billies are allowed to run indiscriminately with the nannies a high death-rate is likely to be experienced from this cause.

FENCES.

One of the first essentials is to have the property well fenced. The best results from the use of goats are undoubtedly obtained on farms sufficiently subdivided to enable goats to be rotated and held on any desired area. Good work may be done, however, by allowing the animals greater freedom in cases where the blackberry is in isolated patches. An excellent example of this is to be seen on the farm of Mr. B. Griffiths, Wai-iti, where, on one block of 190 acres, thirty goats are completely controlling isolated patches.

It is not necessary that special fences be provided for the goats. A well-constructed seven-wire sheep-proof fence is sufficient if care be taken to see that there are no hollows under the bottom wire.

FIG. 2. EXAMPLE OF WORK OF GOATS ON ISOLATED BLACKBERRY ON THE FARM OF MR. B. GRIFFITHS, WAI-ITI.

This bush is very old, and at one stage covered a considerable area, but in its present state is no longer a menace.

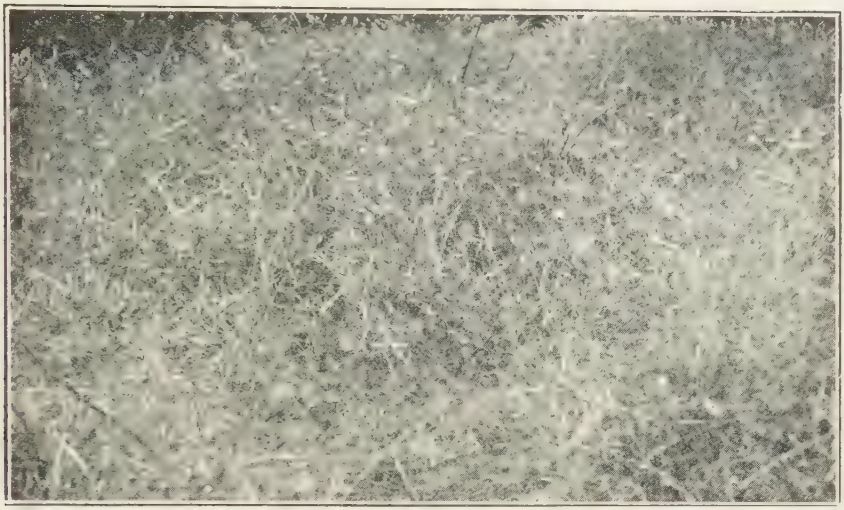


FIG. 3. A VERY DENSE BUSH, AT ONE TIME IMPENETRABLE AND STANDING 5 FT. HIGH.

It will be noticed that tracks are being formed through the bush, and grass is gradually establishing. In a comparatively short time this area will be opened so that sheep can graze it without danger of becoming entangled.

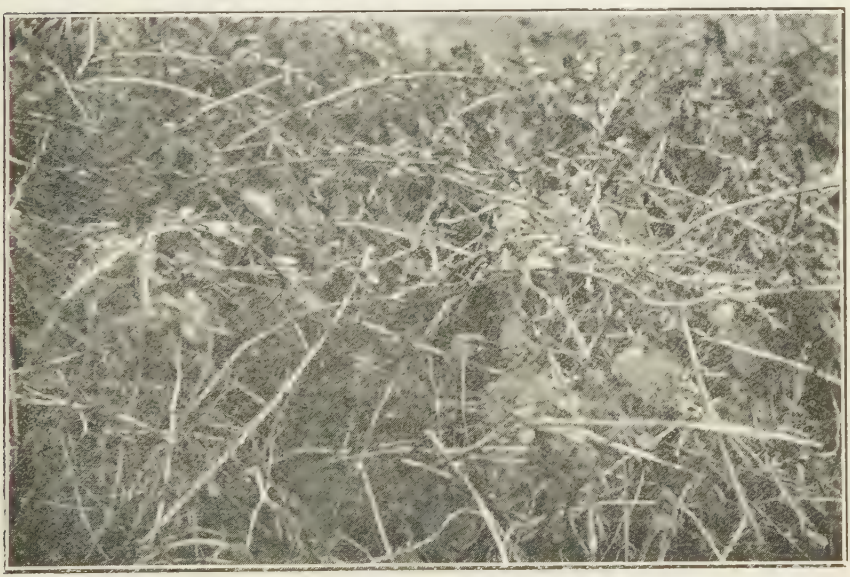


FIG. 4. ANOTHER EXAMPLE OF A DENSE ISOLATED BUSH 5 FT. HIGH, SHOWING HOW GOATS ARE GRADUALLY BREAKING IN FROM THE EDGE.

The fence-line should be cleared, so that no stumps or logs are left as jumping-off places for the animals. It is impossible to prevent kids from straying, but they will always return if their mothers are confined.

CONDITION OF BLACKBERRY MOST SUITABLE FOR GOATS.

It would appear that goats prefer the secondary shoots and growing tips of old runners, rather than the young juicy shoots such as make their appearance after old blackberry is burnt. It has been noticed that when the whole area has been burnt the young growth, especially in spring, will get away from the goats. As the season advances, and the shoots harden up, the goats will return to the attack and get the plant under control again. Having observed this characteristic of the animal, some farmers refrain entirely from burning, relying wholly on goats to crush the blackberry even on newly acquired country overrun with the pest. If this course is adopted it stands to reason that a considerable number will be required per acre to be effective in a reasonable time.

The most economical method is to burn, thus reducing the feed available to goats. Even though the young growth is not so palatable, it will be found that blackberry can be kept under control by a comparatively small flock under these conditions. At the same time the block being treated should be stocked fairly heavily with sheep in order to keep down the grass, in this way preventing the goats from feeding on that which might otherwise be the more easily procured fodder.

SUMMARY.

In Waimea County farmers are endeavouring to breed pure Angoras, as they are considered a better herbaceous-feeding animal than the crossbred, and the returns from Angora wool more than compensate for losses of stock. The use of goats has entirely superseded cutting on those farms where given a trial. In order to obtain maximum results good fences are essential, so that goats may be confined on any area at the discretion of the farmer. Billies should be isolated after serving the nannies, in exactly the same manner as rams are removed from ewes. On the whole it is better to burn the blackberry, using sheep in conjunction with goats. It is idle to suggest that goats never eat grass, but they undoubtedly prefer fibrous matter, and by controlling the growth of grass with sheep the goats have not the same opportunity of cultivating a taste for grass, and are therefore compelled to eat blackberry and other rubbish with greater avidity. Although never definitely tested, it is the firm conviction of goat-owners that the sheep-carrying capacity of their land is increased by the judicious use of these animals.

FARMS VISITED.

In the course of the brief survey on which these notes are based the following farms were visited: B. Griffiths, Wai-iti—farming 190 acres of scattered blackberry country with thirty goats. Mrs. S. Griffiths, Wai-iti—farming 350 acres of dense blackberry country with 150 goats. L. Higgins, Belgrove—farming 600 acres; 50 acres dense blackberry country, remainder scattered; 150 goats. C. Higgins, Belgrove—for one year has had twenty-nine goats on 15 acres of practically impassable blackberry. Fawcett Bros., Tadmor—have recently been farming 150 acres of dense blackberry with eighty goats.

STANDARDIZED RULES FOR JUDGING SHOW FRUIT.

AMENDED LISTS AND SCORE-CARDS.

J. A. CAMPBELL, Director of the Horticulture Division.

IN the year 1917, on the motion of the annual fruitgrowers' conference held at Dunedin, an attempt was made to overcome the principal factors militating against the satisfactory judging of fruit exhibits at the various horticultural and agricultural shows throughout the Dominion. The recommendations of the committee set up by the executive of the New Zealand Fruitgrowers' Federation for the purpose of giving expression to the wishes of the conference in the matter were published in the September, 1917, issue of this *Journal*.

The idea was not necessarily to devise perfect rules and conditions that would be approved by all—the varied opinions on the subject rendering the latter impossible—but rather to place on record something concise on the subject, working on the principle that, while possibly not perfect in every detail, standard rules of the kind, particularly when supported by judging-cards fixing the maximum value of the different features of an exhibit, would not only tend towards greater uniformity among judges, but would be of very great value to exhibitors in the preparation and selection of their exhibits.

The 1917 recommendations on the subject have in the meantime been generally adopted and appreciated as an improvement by all concerned. Experience, however, has suggested that a few minor alterations are necessary, and with this in view the Federation has again taken up the matter. On behalf of that organization the following is therefore submitted and recommended for adoption by all societies interested in fruit exhibitions:—

Apples for show purposes are divided into two classes—dessert and culinary; but approved dessert varieties may be allowed to compete in culinary classes. Both classes are divided into two types—commercial and exhibition. The standard sizes of apples of exhibition and commercial types of both dessert and culinary classes are those sizes set against the various varieties listed hereafter. In the case of cooking-apples for exhibition type the margin of $\frac{1}{8}$ in. above and below the standard size is allowed, but in all other cases the margin allowed is $\frac{1}{16}$ in. All fruit having a greater discrepancy from the standard size than the margin allowed is to be penalized at the discretion of the judge; any exhibit comprising fruit of a greater discrepancy than $\frac{1}{8}$ in. above or below the margin provided is to be disqualified.

Naming: Misnaming in plate and single-case entries disqualifies the entry, and misnaming in connection with collection and case entries warrants disqualification; but such errors may, at the discretion of the judge, be met by a deduction in the total number of points, if in his opinion the incident of misnaming is of minor importance. In the event of disqualification not applying, such deduction is to be not less than 3 and not more than 6 points.

Condition: In judging for condition consideration is to be given to the purpose of the fruit at the time of judging. The aim for a plate of dessert apples or pears should be prime condition for dessert purposes when being judged, and points awarded accordingly.

Market value: The popularity of the variety on the New Zealand markets, together with the condition of the fruit exhibited, is to be the standard of value for allotting points.

DESSERT APPLES.—STANDARD SIZES.

Following is a list of varieties of dessert apples with respect to which $\frac{1}{16}$ in. margin above and below the standard size is allowed. The sizes of varieties not enumerated to be at the discretion of the judge.

Variety.	Exhibition.	Commercial.	Variety.	Exhibition.	Commercial.
	Inches.	Inches.		Inches.	Inches.
Adams Pearmain	3	2 5/8	King of Pippins	3	2 5/8
Allington Pippin	3	2 5/8	London Pippin	3 3/8	2 7/8
American Golden Russet	2 7/8	2 5/8	McLiver's Winesap	3	2 5/8
American Horn	2 7/8	2 5/8	Northern Spy	3 1/8	2 7/8
Beauty of Bath	3	2 5/8	Parlin's Beauty	3 1/4	2 7/8
Blenheim Orange	3	2 5/8	Pioneer	3	2 5/8
Boston Russet	3	2 3/4	Premier	3 1/8	2 7/8
Brownlee's Russet	3	2 3/4	Red Astrachan	3 1/8	2 3/4
Carlton	3	2 3/4	Ribston Pippin	3	2 5/8
Charles Ross	3 1/8	2 3/4	Rokewood	3	2 5/8
Cleopatra	3 1/4	2 3/4	Rome Beauty	3 3/8	2 7/8
Commerce	3	2 3/4	Salome	3	2 3/4
Cornish Aromatic	3 1/8	2 3/4	Scarlet Pearmain	2 7/8	2 5/8
Cox's Orange Pippin	3	2 5/8	Scarlet Nonpareil	3	2 5/8
Delicious	3 1/4	2 3/4	Scarlet Queen	3	2 5/8
Dougherty	3	2 5/8	Senator	3	2 5/8
Duke of Clarence	3 1/8	2 3/4	Shepherd's Perfection	3	2 3/4
Dunn's Favourite	3 3/8	2 3/4	Stark	3	2 3/4
Edward Lippiatt	3	2 3/4	Statesman	3 1/8	2 3/4
Esopus Spitzenberg	3 1/4	2 3/4	Stayman Winesap	3 1/4	2 3/4
Frimley Beauty	3 1/2	2 7/8	Sturmer	3 1/8	2 3/4
Gem	3 1/8	2 7/8	Tasma	3 3/8	2 7/8
Golden Pippin	3	2 5/8	William Anderson	3	2 5/8
Golden Reinette	3	2 5/8	Willie Sharp	3 1/8	2 5/8
Gravenstein	3 1/4	2 7/8	Worcester Pearmain	3	2 5/8
Jonathan	3	2 5/8	Yellow Newtown Pippin	3	2 5/8
King David	3	2 5/8			

COOKING-APPLES.—STANDARD SIZES.

Following is a list of varieties of cooking-apples with respect to which $\frac{1}{8}$ in. margin above and below the standard size is allowed. The sizes of varieties not enumerated to be at the discretion of the judge.

Variety.	Exhibition.	Commercial.	Variety.	Exhibition.	Commercial.
	Inches.	Inches.		Inches.	Inches.
Alfriston	3 1/2	3	John Bull	3 1/4	3
Ballarat	3 5/8	3	London Pippin	3 3/8	3
Blenheim Orange	3 1/8	2 7/8	Lord Suffield	3 3/8	3
Cleopatra	3 1/4	2 7/8	Lord Wolseley	3 1/4	2 7/8
Commerce	3 1/4	2 7/8	Mobb's Royal	3 1/2	3
Delicious	3 1/2	3	Northern Spy	3 3/8	3
Dumelow	3 1/4	3	Parlin's Beauty	3 1/2	3 1/8
Dunn's Favourite	3 1/2	3 1/8	Pioneer	3 1/4	2 7/8
Emperor Alexander	3 3/4	3 1/8	Pride of Australia	3 1/4	2 7/8
French Crab	3 1/8	2 3/4	Prince Alfred	4	3 1/4
Gloria Mundi	3 3/4	3 1/8	Premier	3 1/2	3 1/8
Hoover	3 1/4	3	Reinette du Canada	3 1/2	3 1/8

COOKING-APPLES—*continued.*

Variety.	Exhibition.	Commercial.	Variety.	Exhibition.	Commercial.
	Inches.	Inches.		Inches.	Inches.
Rhode Island Greening	3¼	2⅞	Stone Pippin	3⅛	2¾
Rokewood	3⅜	2⅞	Sturmer	3¼	2⅞
Rymer	3¼	3	Tasma	3½	3
Sharp's Late Red	3¼	3	Washington	3¼	2⅞
Springdale	3¼	2⅞	Yellow Bellefleur	3¼	2⅞

SCORE-CARDS.

Apples, Single Plate Lots.—Dessert.

	Points.
Size and uniformity	15
Form	5
Flavour and condition	30
Colour and appearance	35
Freedom from blemish	15
	100

Apples, Single Plate Lots.—Cooking.

	Points.
Size and uniformity	15
Form	5
Condition and cooking-quality	40
Colour and appearance	25
Freedom from blemish	15
	100

Apples, Collection of Plates.—Dessert.

	Points.
Size and uniformity	15
Form	5
Flavour and condition	20
Colour and appearance	25
Market value	20
Freedom from blemish	15
	100

Apples, Collection of Plates.—Cooking.

	Points.
Size and uniformity	15
Form	5
Condition and cooking-quality	30
Colour and appearance	15
Market value	20
Freedom from blemish	15
	100

Pears, Collection and Plates.

	Points.
Form, size, and uniformity	15
Quality and flavour	25
Condition and appearance	20
Market value	20
Freedom from blemish	20
	100

Pears, Cases.

	Points.
Form and size	10
Storage, transportation, and market value	20
Condition, quality, and appearance	20
Uniformity of sizing and grading	20
Wrapping, height, alignment, and compactness	25
General appearance of package	5
	100

Provincial District Exhibits.

	Points.
Variety of exhibit	15
General artistic effect	15
Quality of exhibits	30
Commercial value	30
Educational value	10
	100

COMMENTS.

Size and Uniformity.—Correct size is quite an important factor, but the provision in the rules previously in force for a penalty of 2 points for every $\frac{1}{16}$ in. in any specimen forming part of an exhibit that was found to be above or below the margins allowed was found impossible to apply in instances where a number of apples were at fault, and at best caused more labour in carrying out accurate measurements than the position warranted. Under the present conditions the judge is left a free hand to fix the penalty, the determining of the standard sizes, together with the provision for disqualification in the event of any fruit of an exhibit being in excess of $\frac{1}{8}$ in. above or below the margins allowed, being held to be a sufficient safeguard. Uniformity has to do with evenness of sizing, shape, colour, and maturity.

Form.—Form has been substituted for typical form, for the reason that typical form is difficult to determine, judges having different views on the subject. Moreover, typical form is often embarrassing to the judge; he, having declared a form with respect to a variety, often finds it difficult to maintain that form when judging further fruits of the same variety. In any case, he frequently fails to do so, causing his judgment in this connection to be inconsistent. It is reasonable to hold that apples of really good shape of any variety should serve that variety well on the show table, but there should be some means of penalizing apples of an objectionable shape. This cannot be relied upon under the heading of "uniformity," as the exhibit may be quite uniform although objectionable in shape. A few points only have been allowed under this heading, but, if necessary, a further deduction may be made under the heading of "appearance" if the objectionable form seriously affects the appearance of the fruit.

Flavour and Condition.—Condition must be taken into account, and also flavour. Arguments are sometimes raised against flavour, as it is held that to determine it fruits must be cut and tasted by the judge, such action frequently spoiling an excellent exhibit required for other shows. Cutting should be practised to a limited extent only. Apples of the same variety and of the same appearance and condition should be given round about equal points for flavour, the judge determining what state of maturity, in his opinion, would give maximum flavour, and judging accordingly.

Colour and Appearance.—It will be noticed that "appearance" has been added to "colour," as it is held that the former will widen the position for the judge, and thereby enable him to express his opinion of an exhibit more fully. Colour is generally looked upon as a high red colour or flush, whereas well-coloured yellow apples, more particularly if a flush is present, such as is found in Cleopatra, Dunn's Favourite, &c., gives such apples a good appearance. "Appearance" may also be used to cover other characteristics of an exhibit.

Colour with respect to cooking-apples is always a controversial question; but when it is considered that attractiveness is of importance in connection with fruit shows generally (which aim at the spectacular), colour—even if it is not necessary in connection with cooking-apples—is worth something from a show point of view. However, in consideration of its more or less minor importance in connection with the cooking-apple, the points have been kept well down as compared with condition and cooking-quality. This has been done in order that highly coloured apples more or less out of condition would not be in a position to score a win over apples excelling in condition and cooking-quality, unless the latter were considerably weaker in other essentials.

Staging.—Points for staging have been deleted. All fruit should be staged on bare plates where plates apply. Any ornamentation of the stand should be attended to by the show officials.

Case Exhibits.—All cases are to bear a standard export label on either end, but such labels should in no way indicate the name of the exhibitor.

Exhibition and Commercial Types.—While not recommending that a hard-and-fast rule be made, it is suggested that plate and collection competitions be mainly restricted to apples of exhibition type, and case competitions to apples of commercial type.

PASTURE TOP-DRESSING IN CANTERBURY.

(Continued.)

F. E. WARD, H.D.A., Instructor in Agriculture, and A. W. HUDSON, B.Agr., B.Sc., Assistant Instructor in Agriculture, Christchurch.

EXPERIMENT ON FARM OF H. E. PERYMAN, TAI TAPU.

IN continuation of the endeavour to determine the relative values of the manures used in the experiments the results of which were published in last month's issue of the *Journal* (page 393), another trial was conducted at Tai Tapu, on the farm of Mr. H. E. Peryman. The manures and quantities applied were the same as those of the 1924 dressing on W. G. Macartney's paddock,* and were arranged in exactly the same order (see June *Journal*); but in this case, owing to a very long area being used, the manured plots were duplicated only. Application of the fertilizers took place on 19th August, 1924, and the field was closed for the hay crop about a month later. The main constituents of the pasture were red clover and perennial rye-grass, with suckling-clover, black medick, yarrow, and Poa pratensis in small quantity in places. Hawkweed and catsear were also present.

OBSERVATIONS DURING GROWTH OF PASTURE.

On 23rd October the area was visited by the writers, and the manured plots were easily distinguished by their superior growth of red clover. At time of cutting the first crop, on 10th December, the clover-growth was very prolific and the manured plots were undoubtedly better than the controls. The difference is shown in the accompanying photograph, where a distinct line of demarcation between a control and a manured plot can be easily distinguished.

On 13th February, 1925, the paddock was visited again, and was found well covered with a splendid growth of clover kept for seed. The controls were still easily distinguishable by the fact that the clover on them was shorter and much paler in colour than on the treated plots. The opportunity of following up the effect of fertilizers seemed too good to lose, and Messrs. Peryman Bros. very kindly consented to cut strips for weighing. In order to reduce the area cut to a minimum, fewer weighings were made than on the first cut—just sufficient being taken to ensure a "probable error" of satisfactorily small dimensions.

Measuring, cutting, and weighing of the crop were carried out in the same manner as adopted with Macartney's, except that a cut was taken down the middle of each strip and through the standing crop, as shown in photo (Fig. 2) in June article. The dimensions of each weighed plot were one width of the mower-cut (5 ft.) by $\frac{1}{2}$ chain, giving an area of $\frac{1}{264}$ acre. Thirty weighings were made in each treatment in the

*(1) Superphosphate (42–44), 2 cwt.; (2) superphosphate (42–44), 2 cwt., plus dried blood, $\frac{1}{2}$ cwt.; (3) basic super (40–43), 2 cwt.; (4) basic super (40–43), 2 cwt., plus dried blood, $\frac{1}{2}$ cwt.

first crop, and twenty-four in the second. The results of weighings of both crops are given in Table 6, and the evaluation of the total increases in Table 7.

Owing to the fact that a greater loss of moisture was expected from the material on the manured plots, due to their greater clover content, separate lots of samples were taken from manured and control areas. The differences which actually occurred were of about the same order as the probable errors, and must therefore be considered negligible. The percentage hay-weight was determined in the manner described in the previous article, and was found to be not less than 28·5 in the first crop and 29·2 in the second (odds of 30 : 1).

Table 6.—Showing Yields of various Manurial Treatments compared with Controls and with one another in the two Hay Crops.

Treatment.	First Crop.				Second Crop.			
	Number of Plots compared.	Tons of Hay per Acre.		Yields expressed as Percentage Controls = 100.	Number of Plots compared.	Tons of Hay per Acre.		Yields expressed as Percentage Controls = 100.
		Yield.	Difference.			Yield.	Difference.	
Super	30	2·70	0·86	147	24	2·13	0·39	123
Control	30	1·84	..	100	24	1·73	..	100
Basic super ..	30	2·60	0·76	142	24	2·28	0·55	132
Super and blood ..	30	2·76	0·74	136	24	2·14	0·38	121
Control	30	2·02	..	100	24	1·76	..	100
Basic super and blood	30	2·55	0·53	126	24	2·18	0·42	124
Super	30	2·70	Difference not significant		24	2·13	Difference not significant.	
Basic super ..	30	2·60			24	2·28		
Basic super ..	30	2·60	Difference not significant		24	2·28	Difference not significant.	
Basic super and blood	30	2·55			24	2·18		
Super and blood ..	30	2·76	0·21	..	24	2·14	Difference not significant.	
Basic super and blood	30	2·55	..	..	24	2·18		

Table 7.—Valuation of Total Increase in Yield of both Crops due to Manure.

Treatment.	Increase over Control in Tons of Hay per Acre (Sum of Increases in First and Second Crops).	Value of Increases at £5 per Ton.	Cost of Manure per Acre at Country Stations.	Net Profit per Acre resulting from Use of Manure.	Percentage Increase above Control.
		£ s. d.	£ s. d.	£ s. d.	
Super	1·25	6 5 0	0 14 6	5 10 6	35
Basic super	1·31	6 11 0	0 13 6	5 17 6	37
Super and blood ..	1·12	5 12 0	1 1 0	4 11 0	29
Basic super and blood ..	0·95	4 15 0	1 0 0	3 15 0	25

FIG. 3. SHOWING PORTION OF TOP-DRESSED AREA ON MR. PERYMAN'S FARM, AS OBSERVED 10/12/24.

Left—super; middle (between men)—control; right—basic super. Line of demarcation may be distinguished running away from observer through position occupied by man on left.

CONCLUSIONS.

All increases over controls are highly significant, but when the manures are compared with one another the differences are not measurable with certainty, excepting in the case of super and blood *versus* basic super and blood in the first crop.

The addition of blood to the phosphates has not produced an increase in yield, and, as seen in Table 7, the phosphates alone show a greater net profit than the mixtures.

To Messrs. Peryman Bros. we are greatly indebted for their valuable aid and interest, which enabled the experiment to be carried out so successfully.

NOTE.—In the June issue, at the top of page 398, an apparent inconsistency in the use of odds will be noticed. Owing to an error in the application of the statistical method, the factor 2·7 (giving odds of 13 : 1) was used instead of 3·2 (giving odds of 30 · 1) in estimating that percentage hay-weight regarded as a certainty. As all quantities had been worked out using factor 2·7, and the article had gone to press before the error was noticed, the slight alteration in the acceptance of odds for certainty was the easiest way out of the difficulty. If we take the "certainty percentage" as 36·8 (·73 × 3·2) = 34·46—say, 34·4 per cent.—the amount to be corrected will be about 0·01 tons in the "Difference" column of the tables. This will necessitate a reduction of about 1s. in each of the two columns headed "Value of Difference at £5 per Ton" and "Net Profit per Acre." It will be seen that the result is not materially affected.

Young pastures should not be fed off too closely, especially with sheep. The young roots need shelter from frosts during winter.

ELECTRIC POWER TRANSMISSION POLES.

SUPPLEMENTARY NOTES ON EUCALYPTS.

J. H. SIMMONDS, Takanini, Auckland.

THE case for the eucalypts grows constantly stronger with increasing information. Since the article published in the March *Journal* was written the writer has had opportunity to extend his researches in both Islands. Valuable plantations have been found in localities not previously visited. Vigorous single specimens and groups numbering up to thousands thus located and inspected show that not a word too much has been said about some of the species already recommended as pole-yielders, while much may be said in favour of other species.

NORTH ISLAND.

The first agreeable surprise was met at "Puketiti," near Tokomaru Bay (A. B. Williams). The homestead and plantations here are in latitude 38, at an altitude of 1,000 ft. to 1,100 ft. above sea-level, and about five miles from the coast. The rainfall is generous, the winter temperature cool and exhilarating, but never severely cold. Less than half a lifetime ago these plateaux and slopes carried only grass and low herbage; now they are adorned with shrubs and trees the larger of which will soon reach 100 ft. in height. Adequate description would run far beyond the limits permitted for these notes. We are concerned just now with eucalypts, and especially with trees that will serve well as electric-wire carriers. *Eucalyptus obliqua*, *E. regnans*, and *E. fastigata* have all found a congenial home at "Puketiti"; but these are trees that yield their best value when sawn up into boards and scantling. *E. botryoides*, *E. saligna*, *E. pilularis*, and *E. eugenioides* are here in small numbers, and could quite certainly be multiplied indefinitely. They are all pole-yielders. *E. amygdalina* and *E. Risdoni* are here in vigorous but not well-formed specimens. *E. ovata* (syn. *E. acervula*) is represented by a stand in which many of the poles are already large enough for use. Last, but in some respects first in importance, is a group of *E. cladocalyx* (syn. *E. corynocalyx*). These are not yet mature enough for cutting, but they are tall and straight, and in a good growing-condition. The example suggests further experiment with this especially valuable pole-tree. Climate and soil here offer great advantages for timber-production.

Fifty miles south of Tokomaru Bay one finds the eucalypts again well represented. Several farms possess smaller or larger numbers of them. On the "Sherwood" estate (Williams Bros.) twenty or more valuable species could be counted. For rapidity of growth and good pole-form *E. botryoides* at present carries the honours. In a belt planted on rich alluvial land one tree has a total height of 95 ft., a usable bole of 50 ft., and a breast-high diameter of 23 in. Other specimens in the same belt are nearly as large. The age of these trees is reported to be under twenty years. The situation is near the coast and not very high above sea-level. Mr. C. H. Williams, one of the brothers, whose private address is "Coventry," Gisborne, takes an enthusiastic interest in tree-culture. Acting upon his suggestion the local County Council is making fencing-post tests with all available exotics, whether eucalypts or durable conifers.

The writer has frequently visited the Wairarapa district and reported upon the cultivation of eucalypts there (*Journal*, June, 1918). During a recent visit he had the pleasure to find young saplings of *E. Bosistoana* flourishing in two localities. These plants represent a very valuable pole-species, and their behaviour under the test of coming seasons will be competently watched and recorded by Mr. H. G. Groves, of "Marangai," to whom we are indebted for raising and distributing the seedlings. Only by such experiments can we hope to adequately advance and enrich our forestry.

At "Tunanui," Hawke's Bay (Sir Andrew Russell), there were a few years ago some eucalypts that, if still standing and flourishing, well merit mention in these supplementary notes. The species represented were the Tasmanian "peppermints," *E. amygdalina* and *E. Risdoni*, both of which are reputed to yield timber exceedingly durable in contact with the ground. The specimens at "Tunanui" were good enough to be recommended as sources of seed for future plantings.

SOUTH ISLAND.

Passing to the South Island, it has not been practicable just recently for the writer to visit Nelson and Marlborough, but in Canterbury and Otago extended journeys have yielded new information of great value. It is too often assumed that the climate throughout these two provinces is very cold during periods of the year. This is far from the truth. Parts of Banks Peninsula and the coastal districts north of Christchurch are relatively very mild. Limited areas in Otago, again, are milder than middle Canterbury. Only by remembering these differences will the useful range of certain eucalypts in these provinces be understood.

On Banks Peninsula, at Charteris Bay, Mr. Orton Bradley has for many years been planting conifers, eucalypts, wattles, and various other trees and shrubs. The mildness of the climate is well evidenced by the eucalypts, for among them we find such species as *E. paniculata*, *E. ficifolia*, and *E. calophylla* variety *rosea*. These, it is true, are only just holding their own in specially favoured situations; but *E. botryoides*, *E. saligna*, and even *E. cladocalyx* are doing well and promising to yield good wire-carrying poles. This report is the result of a quite recent inspection of the trees, and may be taken as very encouraging.

Eastward from Charteris Bay one comes to Little River. Here, at "Okuti" (Dudley Richards), was discovered the best stand of *E. eugenioides* yet seen by the writer in New Zealand. The plantation was started about thirty-one years ago by sowing the seed in small spots prepared by grubbing. There were some losses in the following winter from severe weather, but on the whole the resultant crop was good and fairly regular. The spacing was sufficiently close to suppress side branches except on the margins of the plantation. The trees cover several acres. Seen in perspective their tall boles clothed with furrowed fibrous bark make a very impressive picture. A hasty estimate placed the number of trees at between three thousand and four thousand. A specimen felled by Mr. W. T. Morrison, of the Forest Service, for the Exhibition at Dunedin, showed a large percentage of mature wood. The species has a high reputation for durability of its wood in the ground. For thorough ripening these poles should stand another four or five years, and then they should be easily worth

£1 each on the stump. Seed blown from the plantation into an adjoining grass-paddock has freely germinated and given birth to a chain-wide belt of vigorous seedlings. Through an unfortunate error on the part of a seedsman thirty-one years ago an adjacent area of some acres was sown with *E. haemastoma*. This is a species of very low merit, and the resultant loss to the owner of the land will probably not be less than £1,000. The seed was supplied under the name of "yellow-box," which is the common name for a quite different tree. Primary responsibility for the error no doubt rested upon a seed-collector who was either ignorant or dishonest. The lesson for future planters is obvious.

In the Waipara-Parnassus region the most impressive example of exotic-tree planting is seen at "Cheviot Hills," the residence of Lady Campbell. Adequate description would require several pages, and with Lady Campbell's permission this may be undertaken at some future time. Our present concern is to find poles that will carry electric wires and will be long-lasting. In these plantations the most promising tree for such purpose is the Tasmanian "peppermint," *E. amygdalina*. The rather numerous specimens are growing among other trees and have been drawn up to a good pole-height with straight, clean poles. These plantations are of considerable age, and the "peppermint" trees have probably been mature enough for use for the last twenty years. It is reported that specimens felled even earlier than that yielded very lasting fence-posts.

At "Happy Valley," Motunau (L. H. Campbell), there are wide belts of eucalypts, the total length of which is considerably over a mile. The constituent species are *E. globulus*, *E. obliqua*, and *E. amygdalina*; and here again the "peppermint" is giving a good account of itself as a pole-tree. The numerous specimens have well maintained their place and their right to head-room among the other trees. Some of the poles are large enough for use. The date of planting was not ascertained.

These good examples seem to warrant the inclusion of *E. amygdalina* among the pole-yielders; but we have not yet reached a satisfactory position with respect to choice of strain and collection of seed. The botanical name is now restricted to trees indigenous to Tasmania; but the trees included constitute a group or series rather than a narrowly defined species. Some of the trees have very narrow leaves and small seed-cups, and shed their dead bark right down to the ground. They are often of small dimensions. These trees are called by woodmen "white peppermint," and (in their extreme form) by botanists *E. linearis*. Other trees have wider leaves and larger seed-cups, and carry a dead sub-fibrous bark on the lower part of their stems. The trees are often of good milling dimensions. These are called by the woodmen "black peppermint," and by the botanists *E. amygdalina*. Between these extremes there are many intermediate forms, and no one has yet been able to draw a sharp line between *E. amygdalina* and *E. linearis*. It is said that mature wood from any of these Tasmanian "peppermints" will be long-lasting; but the high reputation of the group as a whole has been won mainly by the "black peppermint." In selecting a tree for cultivation bulk as well as durability has to be considered. The only safe course for the future in this case will be to obtain seed either from certified and approved trees in Tasmania

or from the best and largest of our own acclimatized specimens. Subject to this being done, *E. amygdalina* may be included in our pole list. All these Tasmanian "peppermints" appear to be capable of growing on drier country than is suitable for most of the eucalypts.

The case for *E. Risdoni* is similar to that of *E. amygdalina*. In Tasmania the name stands for a group or series rather than for a distinctly and sharply defined species. Some forms remain small to maturity; others grow to a height of 60 ft. or 80 ft., with a corresponding diameter. In the cooler middle regions of New Zealand we have many excellent specimens; but we have also many feeble or spreading specimens of low value. We appear to have propagated from good and inferior strains without discrimination. *E. Risdoni* timber has a favourable reputation for lasting in the ground, and if in future we resolutely restrict our propagation to seed collected from vigorous trees of large dimensions the species may also be included in the list of pole-yielders. Mr. R. G. Robinson, Superintendent to the Selwyn Plantation Board, finds that *E. Risdoni* maintains a good standard of vigour on parts of the Canterbury Plains that are a little too dry for *E. viminalis*. Apparently both *E. amygdalina* and *E. Risdoni* can claim a high degree of resistance to dry conditions, and if further experience confirms their claim they will be very welcome in situations where ground moisture and rainfall are insufficient for most other timber-yielding species. Tall *E. Risdoni* and smooth-barked *E. amygdalina* may both be seen growing on a rather dry hillside at Whakarewarewa (Rotorua).

A fresh study of *E. Gunnii* as growing in Otago and Southland tends to dismiss all doubts as to the value of that tree for pole-production in those provinces. Splendid specimens noted some years ago in the Drummond district, Southland, have already been described in the *Journal* (April, 1916). Similar specimens recently inspected in the Cemetery Reserve, Tapanui, and in a plantation near Heriot, can now be reported. Many other specimens of smaller dimensions but equally vigorous could be mentioned. The tree is exceedingly resistant to cold, stands up well against strong winds, grows rapidly, and under forest conditions develops a tall clean bole. The heartwood is reported to be dense and very hard. Records of tests for durability are not yet available, but the writer would have no hesitation in anticipating a life of twenty years for quite mature poles not less than 1 ft. 3 in. in diameter at the base. Competent tests should be made without delay.

In the course of this research several species of eucalypts that were supposed to be climatically barred from descending farther south than about latitude 43 have been found in a flourishing condition in warmer parts of Otago. There appears to be in progress an acclimatizing process, which, aided by persistently careful selection of parent trees, may be expected to ultimately extend the range of many valuable species.

The Deer and Wild-pig Nuisances.—By means of an open shooting season in certain districts and bounty payments made through the State Forest Service a total of 7,433 deer was accounted for during the official year 1924–25. In the same period over 9,000 wild pigs were destroyed under a system of small bounties.

STINKING-SMUT OF WHEAT.

III. FIELD GERMINATION OF SEED TREATED WITH FORMALIN AND CLARKE'S WHEAT PROTECTOR.

J. C. NEILL, Field Mycologist, Biological Laboratory, Wellington.

IT was noted in Article II of the present series (*Journal*, May, 1925) that the field germination of wheat treated with formalin and with Clarke's Wheat Protector presented features which required further investigation. The results are here recorded of a series of field sowings of wheat which had been treated with these two disinfectants, and in which the conditions of treatment followed more closely the usual procedure in farming practice. The chief difference consisted in allowing the treated seed to dry out slowly in bulk, instead of the rapid artificial drying of small lots practised in the former experiments.

EXPERIMENTAL METHOD.

Formalin: Seed dipped in bulk for ten minutes in a solution of 1 pint of commercial formalin (39 per cent. formaldehyde) to 40 gallons water, then left in bag to drain and gradually dry out.

Clarke's Wheat Protector: Seed thoroughly wetted with solution made up by adding contents of packet (1 lb.) to 1½ gallons water, then left in bag to gradually dry out.

Two samples of Solid-straw Tuscan wheat were used, one Canterbury-grown and harvested in 1924 (from the same line used in the experiments recorded in the May *Journal*), and the other grown at Weraroa and harvested in February, 1925. Date of treatment, 22nd April, 1925. Sowings were made at the Central Development Farm, Weraroa, five hours, twenty-nine hours, forty-eight hours, seven days, and twenty-one days after treatment, the seeds being sown by hand 2 in. apart, 100 seeds to the row. Germinations were counted when the plants were 4 in. to 6 in. high.

SUMMARY OF EXPERIMENTAL RESULTS SHOWN IN TABLE.

Formalin: On the new seed the treatment did little damage, even after holding for three weeks, while on the one-year-old seed there was an immediate loss of germination of 5 per cent., which increased steadily up to 26 per cent. after holding for three weeks.

Clarke's Wheat Protector: This treatment gave an increased germination over the untreated seed both on the new and one-year-old seed, though the effect was more marked on the latter. No significant difference was shown by the sowings made at the various intervals up to three weeks after treatment.

Table showing Field Germination of Wheat treated with Formalin and Clarke's Wheat Protector.

Treatment.	5 Hours.		29 Hours.		48 Hours.		7 Days.		21 Days.		Difference from Mean Control.				
	Counts.	Mean.	Counts.	Mean.	Counts.	Mean.	Counts.	Mean.	Counts.	Mean.	5 Hours.	29 Hours.	48 Hours.	7 Days.	21 Days.
1924 Tuscan.															
Untreated	86, 86	86·0	79, 90	84·5	81, 81	81·0	81, 83	82·0	75, 75	75·0	..	..	..	..	..
Formalin	84, 77, 80, 77	79·5	77, 74, 75, 82	77·0	76, 70, 70, 69	71·2	65, 68, 66, 67	65·7	50, 53, 43, 18	18·5	3·2	6·8	11·6	1·6	26·6
Untreated	85, 84	84·5	82, 89	85·5	85, 85	85·0	81, 77	79·5	72, 73	72·5	..	..	..	..	..
Clarke's Protector	88, 94, 91, 93	91·5	94, 89, 88, 88	89·7	91, 92, 91, 89	90·7	88, 90, 86, 92	89·0	82, 78, 83, 78	80·2	6·8	+5·9	+7·9	+9·7	+5·1
Untreated	83, 84	83·5	81, 82	81·5	78, 87	82·5	80, 78	77·5	81, 75	78·0	..	..	..	..	..
1925 Tuscan.															
Untreated	88, 83	85·5	77, 72	74·5	76, 78	77·0	78, 88	83·0	73, 79	76·0	..	..	..	..	..
Formalin	81, 86, 78, 80	81·2	70, 73, 76, 80	74·7	72, 69, 77, 77	73·7	82, 86, 75, 80	79·2	77, 69, 78, 66	72·5	1·2	2·3	−5·5	−0·6	−2·5
Untreated	72, 73	72·5	76, 79	77·5	78, 84	81·0	78, 80	79·0	76, 72	74·0	..	..	..	..	..
Clarke's Protector	82, 83, 82, 84	82·7	83, 85, 82, 78	82·0	77, 86, 85, 83	82·7	82, 80, 83, 87	83·0	81, 76, 77, 78	78·2	−·7	3·0	3·2	3·2	3·2
Untreated	85, 79	82·0	80, 78	79·0	83, 76	79·5	77, 78	77·5	76, 74	75·0	..	..	..	..	..

THE WAX-MOTH AND ITS CONTROL.

E. A. EARP, Senior Apiary Instructor, Wellington.

OF the two bee or wax moths—*Galleria mellonella* and *Achræa grissella*—troublesome to beekeepers in New Zealand the larger one (*G. mellonella*) is the more destructive. This moth was first observed by apiarists in Taranaki in 1904, and it is probable that it came from Australia with importations of bees and queens. It is included among the diseases of bees that come within the provisions of our Apiaries Act, and beekeepers who fail to notify its presence are liable to prosecution.

Observations made show that the moth is spreading, it having been reported recently in districts where it was previously unknown. It is widely distributed in the North Island. For years it has been a serious pest to beekeepers in the Nelson District, where it was observed by the writer in 1909, and during the past three years it has made its appearance in Marlborough. The moth is fairly common in hives as far south as Westport. The transport of section honey and bees from the Nelson District may account for its spread to Marlborough and the west-coast areas.

Beekeepers of those districts who have had considerable experience with the larger moth are finding it more difficult to control than foul-brood, mainly owing to the presence of large numbers of colonies of black bees and to climatic conditions which are in favour of the development of the pest. Where proper methods of control are lacking, through the beekeeper failing to recognize the insects, he will find that they take steady toll of his valuable combs, and at the same time totally destroy weak or queenless colonies. The warmer conditions of parts of the North Island during the winter months extend the breeding season of the moths. As no dormant period appears to exist the larvæ are a constant menace, especially as they are active when combs are not in use and the bees are least aggressive. Possibly the fact that the moths are seldom to be seen except at dark, unless disturbed in their hiding-places, may account to some extent for this pest of the apiary not being more commonly known.

The moth lays its eggs on the combs, sides, and bottom of the frames and in crevices of the hives, where the larvæ can find their way to the combs. The larvæ of the moths have a preference for brood combs, burrowing through them under the cover of strong silken galleries, which they spin as a means of protection from the bees as they advance in their work of destruction. When fully grown the larvæ are from $\frac{7}{8}$ in. to 1 in. in length, and may be detected by holding the comb up to the light. Where the combs in the hives are left undisturbed the beekeeper will often find the cappings of the sealed brood removed and the webs of the larvæ showing as he withdraws the frames. A favourite haunt of the larvæ is on the top of the frames under the mat, or where there are two mats they will get between them. In the daytime they apparently hide, and at night attack the combs, but when the colony becomes weak the larvæ exhibit less fear and attack the combs at all times.

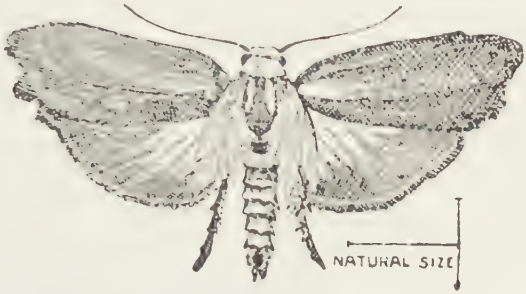


FIG 1. LARGER WAX-MOTH (GALLERIA MELLONELLA).

FIG 2. COMB ATTACKED AND NEARLY DESTROYED BY LARGER WAX-MOTH.

CONTROL MEASURES.

In order to guard against the ravages of the moth all weak hives should be strengthened. Black bees are especially liable to attack, and in those districts where the pest is known to exist no better plan can be followed than to replace old and failing queens with vigorous Italians. The latter are better able to withstand the pest, and if the colonies are kept normal the bees will be able to defend themselves. All odd pieces of comb should be melted or otherwise disposed of, and as the mats afford a particularly good breeding-place these should be destroyed by fire whenever they are judged to be infected. In the case of supers or hive-bodies which have contained moth-infected combs, a careful scorching of the inside corners and crevices should be made with a painter's blow-lamp in order to destroy any eggs or larvæ that may be present.

All combs should be examined periodically, and if traces of the moth are found they will require to be fumigated. In bad cases the operation must be repeated, allowing an interval of thirty days. If only a few combs are to be fumigated they may be suspended about 1 in. apart in empty hives, and the latter piled one on the other, taking care that the junctions of the bodies are made smoke-tight by pasting strips of paper round them. The topmost box should contain no frames. In this box place an old iron saucepan containing live wood-embers, and on to these throw a couple of handfuls of sulphur. Close the cover securely and keep closed for a couple of days.

Bisulphide of carbon may also be used as a fumigating agent. When using this chemical the combs may be put in a tight box, or placed in hives as described, and the same care taken to close all cracks to prevent the fumes from escaping. A quantity of the bisulphide is placed in an open dish on top of the combs. The liquid evaporates, and the fumes, being heavier than air, settle over the combs, thus effectively killing all insect-life present. In case all the eggs are not destroyed the operation may have to be repeated. Great care must be exercised when using this chemical, as it is highly explosive and dangerous. On no account should a fire or light be allowed near the liquid when it is being used.

When a beekeeper is operating in a commercial way, and large numbers of combs have to be dealt with, it is advisable to have a room fitted up for the purpose of fumigation. The combs can either be placed on racks or left in the hive-bodies. If the latter course is followed the hive-bodies require to be spaced so as to allow the fumes to enter freely. If sulphur is used in the process of fumigation, then 2 lb. or 3 lb. may be necessary to effectively destroy the larvæ. Should the eggs of the moth not be destroyed the operation will require to be repeated.

Pasture Top-dressing and Stock.—In the course of an article on the Weraroa Red Poll herd, contributed to the *Journal of Agriculture* of Victoria, by Colonel A. Caddy, he remarks: "The first thing that strikes the visitor to Weraroa (Central Development Farm) is the good pasture, and as a result a general sleek look of healthy contentment is present in all the live-stock. Top-dressing with phosphate of lime is answerable for this, and, as elsewhere, that fertilizer causes the Red Polls to spend most of their time resting and chewing the cud, instead of wandering about restlessly looking for vitaminiferous feed."

USE OF THE BAUMÉ HYDROMETER IN WINE AND CIDER MAKING.

J. C. WOODFIN, Vine and Wine Instructor, Horticulture Division.

HYDROMETERS, of which there are several types, are instruments which sink in liquids until they displace a volume equal to themselves in weight. In a dense liquid, therefore, they will not sink so deeply as in a less dense one. The Baumé hydrometer is weighted with shot or quicksilver so that it sinks in pure distilled water to the zero degree on the scale marked on its spindle. The degrees on the spindle indicate the amount of solids (which for practical purposes can be calculated as all sugar) contained in the juice.

This hydrometer is used in several trades, and, although an arbitrary scale so far as wine is concerned, it is very popular among winemakers. This is owing to the fact that by a curious coincidence degrees Baumé (within the range usually employed by winemakers) recorded in an unfermented must or fruit-juice approximately indicate the degree or percentage of absolute alcohol the wine will contain after complete fermentation. Thus a must registering from 10° to 11° Baumé will produce a wine containing from 10 to 11 per cent. of absolute alcohol—that is, 10 to 11 measures or volumes of pure alcohol in 100 measures of wine when all the sugar has been transformed, which is not always the case, especially if the alcoholic strength goes beyond 14 per cent. Above and below these degrees (10 to 11 per cent.) the quantity of alcohol does not correspond so nearly, but the indications are near enough for general purposes.

The ratio of alcohol produced to density is not the same in apple-juice as in grape-juice. To estimate the approximate amount of alcohol which apple-juice will produce on complete fermentation, 1° should be deducted from the degree Baumé recorded in the fresh juice. Apple-juice registering 8° Baumé, and subsequently fermented dry, will be found on analysis to contain approximately 7 per cent. of alcohol by volume.

The juice should be freshly expressed from the fruit, tested in a glass jar or cylinder before any fermentation sets in, and the degree Baumé read in a line with the main surface of the liquid—not at the point where it has mounted up the spindle by capillarity. The scale of this hydrometer being graduated at a temperature of 60° F., it is essential to bring the temperature of the liquid being tested as near as possible to that degree. If the temperature is slightly above 60°, add one-fifteenth of a degree Baumé for each degree Fahrenheit; or if below, subtract one-fifteenth.

In order to ascertain if a fruit has attained the maximum of saccharine contents, an average sample should be taken from time to time during the ripening-period, crushed, and strained into a test jar; when no further increase is indicated by the Baumé scale the fruit may be considered ready for making wine.

If the degree Baumé of the must is not high enough to produce the alcohol desired in the finished wine, then for each additional degree or per cent. of alcohol required add 4 oz. of No. 1 cane-sugar to each gallon of must, bearing in mind that to obtain a dry wine it

is not advisable to raise the saccharine contents of the must above 14° Baumé. The sugar should be added before fermentation sets in and thoroughly dissolved in the must, as otherwise it will form a hard cake on the bottom of the barrel or vat.

Must below 14° Baumé will ferment out dry under favourable conditions, but above 14° the complete fermentation is not to be depended on. The progress of fermentation can be followed by observing the gradual sinking of the hydrometer in the liquid. In wine which has fermented out nearly dry—that is, in which most of the sugar has been transformed into alcohol and carbon dioxide—the Baumé will sink to about zero, the exact point depending principally on the amount of alcohol present, alcohol being lighter than water. At this stage the wine, including that pressed from the skins, is usually transferred from the fermentation-vat to a maturing vat or cask to continue there a slow fermentation, during which the remaining sugar is transformed into alcohol and carbon dioxide, or, in the case of sweet wine, sufficient alcohol is formed to prevent the ferments continuing their work.

In making sweet wines on a commercial scale sufficient alcohol is added to the wine, when the saccharine contents have fermented out to 2° or 4° Baumé, to bring up the alcoholic contents to 16 per cent. This addition prevents further fermentation, and the remaining 2° to 4° Baumé, which represents $3\frac{1}{2}$ to 7 per cent. of sugar, gives the desired sweetness. In making small quantities of sweet wine, and when no alcohol is added, sufficient sugar should be dissolved in the wine to bring it up to 18° or 20° Baumé before it is run into the maturing-cask, which must not be bunged tightly until all fermentation has ceased.

The Baumé hydrometer, graduated 1° to 25° for liquids heavier than water, and glass jars for use with same, are obtainable for a few shillings from wholesale chemists or scientific-instrument dealers.

INTERIM RETURN OF SHEEP, 1925.

THE following particulars, showing the approximate number of sheep in New Zealand at 30th April, 1925, compared with the final figures for 1924, were gazetted on 25th June:—

District.	Number of Sheep.		Difference.
	Final Return, 1924.	Interim Return, 1925.	
Auckland	1,968,115	1,995,270	+27,155
Gisborne-Hawke's Bay ..	6,277,917	6,178,116	−99,801
Wellington-West Coast ..	5,232,685	5,081,071	−151,614
North Island totals ..	13,478,717	13,254,457	−224,260
Marlborough-Nelson-Westland ..	1,272,533	1,330,064	+57,531
Canterbury-Kaikoura ..	4,711,095	4,934,981	+223,886
Otago	4,313,431	4,483,240	+169,809
South Island totals ..	10,297,059	10,748,285	+451,226
Dominion totals ..	23,775,776	24,002,742	+226,966

EFFECT OF PROJECTING STAPLES ON BUTTER PACKED IN "FOUR-ONE" BOXES.

An investigation has recently been carried out by the State Forest Service (Forest Products Branch), in co-operation with the Dominion Laboratory, into the effect of projecting staple heads or points upon butter packed in "four-one" and similar wire-bound boxes. The following report by Mr. W. Donovan, Assistant Dominion Analyst, issued by the Forest Service, presents the information acquired. It will be noted that standard export packing with two thicknesses of paraffin paper is considered effective protection against rusting of staple heads and points.

The construction of four-one and similar boxes, such as the Saranac package recently adopted by the New Zealand Co-operative Dairy Company, entails the use of staples upon the inner surface of the ends. The points of the staples securing the outer wires of the boxes also pierce the sides, top, and bottom, being clinched over upon the inner surfaces. Occasionally, however, the clinching is missed, and the sharp points then project into the box. It was desired to ascertain if such projecting points would injuriously affect the quality of butter packed in the boxes.

Method of Test.—Small wooden boxes were obtained, and wire staples driven into the sides so that the points projected inside about $\frac{1}{4}$ in. Half the staples were made from black iron wire, and half from galvanized iron. In some boxes the points were left projecting, in others they were clinched. In filling with butter, some were not lined, some were lined with a single layer of paper, and the remainder with a double layer, as for export. The boxes were filled on 4th November, 1924, and placed in cool store until 25th May, 1925, a period of six months and a half, when they were examined.

Results.—In the first series, where no protective paper was used, the iron-wire staples were badly rusted, and had discoloured the butter for a distance of $\frac{1}{4}$ in. round each point. The zinc coating of the galvanized-iron wire staples had also been attacked, but the iron was apparently not affected. There was no discoloration of the butter round these staples, and no marked taste has been imparted to it. Chemical examination showed that it contained only a trace of zinc.

In the second series, in which the boxes were lined with a single layer of paper, only one in three of the unclinched staples had come in direct contact with the butter, such staples being rusted if iron, or somewhat corroded if galvanized, as in the previous series. None of the clinched staples had come in contact with the butter, and there was very little discoloration of the paper.

In the third series, lining the boxes with a double layer of paper, as for export, had reduced still further the proportion of projecting points that had come in contact with the butter, and had afforded effective protection from all contact with clinched staples.

Conclusions.—The proportion of staples missed in clinching in the boxes under consideration is very small, and probably less than one-third of these will pierce a double layer of lining-paper. While the galvanized coating remains, the iron will not be sufficiently attacked to cause discoloration, and in any case only a very small area of butter will be affected. This can be readily removed.

The boxes can therefore be safely used for the export of butter if lined with paper in the usual way, and there is no need to coat the staples with a protective covering of paraffin-wax or shellac.

Average Grades of Dairy Factories, 1924–25.—In the list published in last month's *Journal* the average grade of the Rongotea Company, given as 92·14 points, should have been 93·08. Similarly, the average of the Rata Company should have been 93·90, not 93·42.

TESTING OF PUREBRED DAIRY COWS.

APRIL TO JUNE C.O.R. LIST.

W. M. SINGLETON, Director of the Dairy Division, Wellington.

THE appended list gives particulars of performance of all cows which received certificates of record during months of April, May, and June—a comparatively quiet period of the year in the working of the system.

The highest butterfat-yield, and in many respects the most worthy performance, is that of Messrs. Ranstead Bros.' Milking Shorthorn cow Matangi Quality 4th, which is credited with 22,010·5lb. milk and 978·47 lb. butterfat in 365 days. Her age at commencement of the test was 4 years 190 days, and it is unfortunate that she should have calved some eleven days too late to qualify for a first-class certificate. According to our records she should, on a normal gestation, have calved within the period allowed by the rules. This was Matangi Quality 4th's third consecutive season on C.O.R. test, and on each of her previous performances she gained a first-class C.O.R. which placed her at the head of her class for the breed. She was calved on 15th August, 1919, and began her first test on 1st December, 1921, which resulted in a production of 591·89 lb. butterfat, her age at start being 2 years 109 days. On 15th January, 1923, at the age of 3 years 153 days, she was commenced on her second test, and gained a first-class certificate for 678·02 lb. butterfat. It is with regret that we record the death, through calving complications, of Matangi Quality 4th, for undoubtedly she was one of the most outstanding cows of the Milking Shorthorn breed in New Zealand.

Another record of interest appearing in this list is that of Messrs. North and Sons' wonderful old cow Burkeyje Sylvia Posch. She already had six first-class certificates of record to her credit, and missed the seventh by only ten days. Commencing at 11 years 215 days, she has given a yield of 864·38 lb. butterfat in 365 days. So far as we are able to ascertain, Burkeyje Sylvia Posch holds the world's record in any breed for "long-distance" authenticated performance.

LIST OF RECORDS.

* Cow milked three times daily during whole lactation period. † Milked three times daily during part of period.

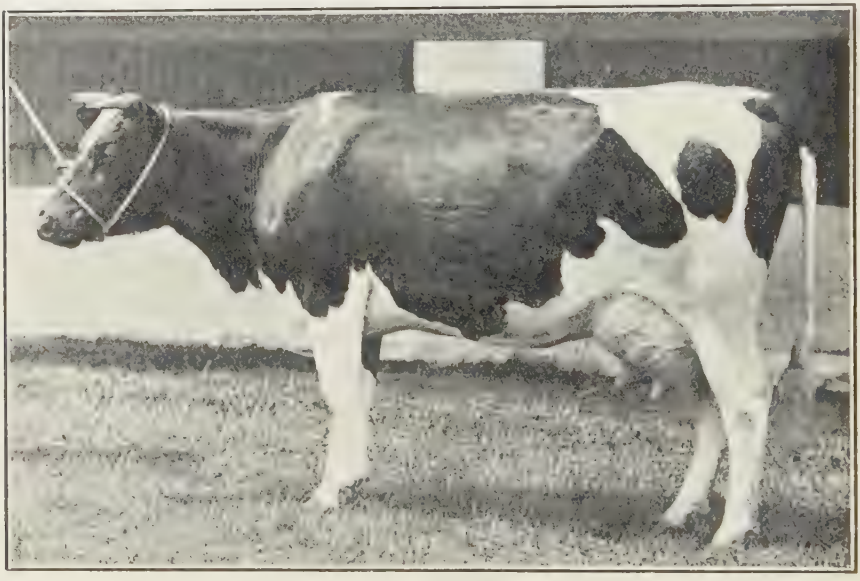
Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
	JERSEYS.					
Junior Two-year-old.		Yrs. dys.	lb.		lb.	lb.
Pukatea Zona ..	G. R. Bell, Waipuku ..	1 363	240·5	365	7,612·75	455·49
Besses Golden Maize..	H. Stonex, Bell Block ..	1 249	240·5	321	5,707·4	406·06
Rosy Creek Peace ..	E. Griffiths, Cambridge ..	1 345	240·5	365	6,472·8	395·14
Peaceful's Lady ..	E. Griffiths, Cambridge ..	1 356	240·5	363	6,905·1	394·87
Oxford Silver Fox ..	G. A. Gammon, Marton ..	1 355	240·5	345	5,952·2	290·18
Riverswood Vanity ..	J. Nicolson, Kaupokonui ..	1 62	240·5	365	5,218·7	266·91
Senior Two-year-old.						
Diana Mahone† ..	C. Stevens, Maungatapere ..	2 226	263·1	365	8,197·3	472·17
Grafton Girlene† ..	C. Stevens, Maungatapere ..	2 294	269·9	365	7,724·1	415·69

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
JERSEYS—*continued.*						
Three-year-old.		Yrs. dys.	lb.		lb.	lb.
Hopeful Choice ..	W. T. Williams, Pukehou ..	3 136	290·6	365	8,582·4	514·72
Orange Dale Blossom	W. J. Hall, Matatoki ..	3 327	309·7	271	9,042·2	468·31
Top's Beauty ..	H. J. Burrell, Bunnythorpe	3 98	286·8	257	6,529·1	342·34
Daisy M. O. ..	F. E. Day, Tamahere .	3 199	296·9	365	4,503·9	317·21
Four-year-old.						
Highstead's Dairylike	F. E. Day, Tamahere ..	4 70	321·4	361	9,298·7	525·23
Genoa's Girlie ..	J. Cloke, Lepperton ..	4 264	339·9	308	8,392·5	441·62
Hawkesbury Rosebud	John Robb, Westmere ..	4 339	347·4	316	8,216·0	430·80
Heather Mahone† ..	T. Wells, Awakino Point ..	4 81	321·6	342	7,147·7	396·97
Mature.						
Halesworth Creamy ..	H. Peoples, Drury ..	5 198	350·0	365	12,405·0	661·35
Belvedere Daphne ..	E. B. Eagle, Greytown ..	6 24	350·0	365	12,853·9	615·27
Belvedere Lady's Joyce	E. B. Eagle, Greytown ..	6 341	350·0	365	10,969·9	596·77
Antonina	Taranaki Hospital Board, New Plymouth	8 281	350·0	364	11,877·8	595·05
Lavington's Briar ..	J. O. J. Oliver, Temuka ..	9 93	350·0	365	9,122·3	406·47
Mountain View's Fancy	Mrs. O'Callaghan, Tikinui ..	9 102	350·0	365	6,585·9	403·95
Rozel Grizette ..	W. T. S. Wilson, Otahuhu..	5 245	350·0	264	6,658·6	379·62
FRIESIANS.						
Junior Two-year-old.						
Nettie Ollie Korndyke de Kol*	John Court, Ltd., Auckland	2 46	245·1	358	17,874·9	609·18
Rosevale Kaatje Colantha Posch*	North and Sons, Omimi ..	2 57	246·2	365	18,241·9	585·70
Hillside Mooie Blanco*	Mickell Bros., Te Horo ..	2 119	252·4	365	11,739·0	560·18
Rosevale Amelia Sylvia*	North and Sons, Omimi ..	2 66	246·5	365	14,754·2	472·85
Friesland Rose Queen†	P. Nesbit, Rata	2 154	255·9	365	12,034·0	406·44
Bainfield Freda Sylvia*	W. D. Hunt, Waikiwi ..	2 78	248·3	250	8,234·5	362·61
Winifred Mary Argyle de Kol†	S. Andrew, Kaikoura ..	2 17	242·2	365	9,151·9	346·63
Grambling Homestead Lassie*	John Court, Ltd., Auckland	2 72	247·7	342	9,784·8	297·96
Senior Two-year-old.						
Cordyline Griselda Lass†	Mrs. A. M. Hodgson, Tamahere	2 240	264·5	365	11,722·7	493·55
Ryvington Pontiac Colleen*	Mrs. A. M. Hodgson, Tamahere	2 193	259·8	365	13,499·0	433·30
Junior Three-year-old.						
Mapleshade Pietje Beets*	F. Smedley, Te Awamutu ..	3 31	280·1	365	16,320·4	566·53
Bloomfield Fayne Johanna*	R. C. Allen, Annandale ..	3 54	282·4	365	15,178·5	546·62
Betsy Blanco Beets*	F. Smedley, Te Awamutu ..	3 92	286·2	365	14,751·9	500·31
Senior Three-year-old.						
Pareora Janette* ..	A. S. Elworthy, Timaru ..	3 200	297·0	365	18,319·3	612·64
Rosevale Queen Sylvia Triumph*	North and Sons, Omimi ..	3 217	298·7	242	16,768·7	589·60
Woodlands Korndyke*	John Court, Ltd., Auckland	3 221	299·1	305	9,392·7	344·77

VICTORIA REGIA (F. J. FINER, NGUTUWERA).

C.O.R., 1925, in Jersey senior two-year-old class: 13,042·7 lb. milk, 643·61 lb. butterfat.



HINEMOA BEAUTY (T. R. EADES' EDENDALE).

C.O.R., 1924, in Friesian senior four-year-old class: 23,973 lb. milk, 822·37 lb. butterfat, 365 days.

LIST OF RECORDS—*continued.*

Name of Cow and Class.	Tested by	Age at Start of Test.	Fat req'd for Cert.	Yield for Season.		
				Days.	Milk.	Fat.
			FRIESIANS —*continued.*			
Mature.		Yrs. dys.	lb.		lb.	lb.
Rosevale May Abbekerk*	North and Sons, Omimi ..	5 50	350	365	21,688·1	743·29
Springbank Tensen Pauline 2nd*	John Court, Ltd., Auckland	6 7	350	246	12,203·7	443·96
			MILKING SHORTHORNS.			
Mature.						
Joyce 3rd of Cornwall Park*	R. S. Allan, Hatuma ..	8 9	350	365	18,986·8	709·13
			RED POLLS.			
Two-year-old.						
Otahuna Nellie† ..	G. S. Young, West Plains ..	2 57	246·2	342	9,749·3	405·42

Second-class Certificates.

			JERSEYS.			
Two-year-old.						
Airton Magicienne* ..	W. H. Waterhouse, Airton ..	2 20	242·5	351	6,752·5	356·41
Mature.						
Waitapu's Lady ..	E. Sinclair, Cheltenham ..	6 350	350·0	365	9,963·0	571·88
			FRIESIANS.			
Senior Three-year-old.						
Pietertje Ormsby Mercedes Queen*	John Court, Ltd., Auckland	3 256	302·6	365	14,614·5	516·14
Mature.						
Burkeyje Sylvia Posch*	North and Sons, Omimi ..	11 215	350·0	365	27,161·4	864·38
Dominion Queen Elizabeth*	H. R. Green, Kairanga ..	9 90	350·0	365	20,615·5	733·61
			MILKING SHORTHORNS.			
Four-year-old.						
Matangi Quality 4th*	Ranstead Bros., Matangi ..	4 190	332·5	365	22,010·5	978·47

STOCK SLAUGHTERED, 1924–25.

THE following are the numbers of stock slaughtered at abattoirs, meat-export works, bacon-factories, and ordinary registered slaughterhouses throughout the Dominion during the year ended 31st March, 1925 :—

Stock.	Abattoirs.	Meat-export Works.	Bacon-factories.	Ordinary Slaughterhouses.	Totals.
Cattle ..	149,549	247,883	..	90,706	488,138
Calves ..	41,221	22,775	..	3,311	67,307
Sheep ..	541,679	2,564,530	..	248,091	3,354,300
Lambs ..	71,338	4,832,493	..	19,542	4,923,373
Swine ..	100,043	142,168	37,714	27,849	307,774

DETERIORATION OF CROWN LANDS IN MID-WEST DISTRICTS OF THE NORTH ISLAND.

INVESTIGATION AND REPORT BY SPECIAL COMMITTEE.

In November last a special Committee was appointed by the Minister of Lands, Hon. A. D. McLeod, to investigate the deterioration of Crown lands in the district covered roughly by the Whangamomona, Ohura, Waitomo, Otorohanga, Kawhia, Raglan, Kaitieke, Waitotara, and Waimarino Counties. The personnel of the Committee consisted of Messrs. G. H. Bullard, Commissioner of Crown Lands for Canterbury (previously Commissioner for Taranaki); F. O. Cameron, farmer, Hastings; E. P. Fowler, District Valuer, Masterton; P. Keller, District Engineer, Public Works Department, Taumarunui; E. B. Levy, Agrostologist, Department of Agriculture; and W. Roberton, farmer, Tahora.

The operative clauses of the order of reference for the investigation were as follows:—

(*a.*) Whether certain Crown leaseholds situated within the above blocks and counties are too large or too small for successful occupation by the present lessees, and whether relief could be given by surrendering certain unprofitable portions of such leases, and the best means for giving effect to such a recommendation.

(*b.*) Whether a contributing cause to the lessees' difficulties is the lack of formed access, and also due in part to the long distance they are situated away from railway or distributing centres. If the former, what recommendations are made for improving the position.

(*c.*) To report specially whether the lands are suitable for settlement, and whether the deterioration in pastures complained of in many cases is due to inherent natural and climatic conditions, or to the failure of the lessee to properly stock, surface-sow, and manure, or to improper methods, or to lack of capital.

(*d.*) To report as to the necessity for revaluation in view of present-day prices as compared with values ruling at the time of selection.

(*e.*) To report whether any concession, such as postponement or remission of rent for a specified period, is necessary to ensure the working of the lands profitably and put the lessees on a satisfactory footing.

(*f.*) Generally to report on and recommend as to the best method of dealing with these lands, with particular regard to means of coping with second growth, water-fern, &c., and generally as to what means are likely to be successful in again bringing such lands to profit, and the probably cost per acre involved.

(*g.*) To ascertain to what extent the Crown tenants have mortgaged their holdings, what is the rate of interest payable thereon, how much is mortgaged to the State Advances Office, and how much to private persons or firms, and to report whether any action is advisable in connection therewith.

REPORT OF THE COMMITTEE.

The Committee recently made the following report to the Minister:—

We covered the greater part of the area under review, and for the purpose of obtaining further information and evidence held meetings of settlers at sixteen different centres, and also took evidence from individual farmers *en route*, and from other persons interested or having knowledge of the various questions involved. The meetings were on the whole well attended, and much valuable information was derived therefrom.

NATURE OF THE COUNTRY.

The country under consideration may be divided into three classes: (*a*) Hilly forest country too steep for ploughing, and comprising the greater portion of the area; (*b*) forest country containing a large proportion of ploughable land; (*c*) open fern and scrub country, most of which is ploughable. The altitudes vary from sea-level up to about 2,000 ft., and the heights of the hills above the valleys vary up to 800 ft., an average being about 600 ft.

The soils are of the following types: Papa, sandstone, friable volcanic loams, and in places pure pumice, or mixtures of the above. In the Waitomo County there are large outcrops of limestone and rhyolite. The papa soils are the most fertile, but papa country, where steep, slips badly. The volcanic loams generally, with reasonable treatment, become profitable soils. Sandstone country is generally very steep and does not lend itself so well to treatment. Pumice soils are perhaps the poorest, and are difficult to grass except with special manurial treatment.

The forest cover varied according to quality of soil: (*a*) On the richer portions of the land tawa was dominant, associated with pukatea, white-pine, maire, matai, and mahoe; (*b*) on the easy average-quality slopes tawa was dominant, associated with rimu, matai, miro, rata, and totara; (*c*) on the poorer, steeper, and harder country were tawhero, rewarewa, and hinau; (*d*) on the topmost sandstone ridges were black-birch and tawhero mainly; (*e*) on the open scrub country the natural vegetation consisted mostly of bracken fern, associated with tutu and, in places, manuka. Much of the country was covered by a spongy, peaty substance known as pukahu, most evident in wet tawhero country. The forests on the whole contained little milling-timber, although here and there some timber had been milled where the access was good.

NATURE OF DETERIORATION.

The deterioration complained of and markedly in evidence consists largely in a dying-out or in a replacement of the grasses and clovers sown, by various classes of fern, herb, and scrub growths—namely, bracken fern, hard fern, soft fern, wineberry, manuka, fuchsia, tutu, and hutiwai. The growth of these plants on the country does not necessarily indicate that the land is too poor to grow grass, but rather that there is a strong natural tendency for that country to revert back to its natural forest cover. The fern and scrub growths that make their appearance in the clearing soon after the forest has been felled and burnt constitute really the first phase in the succession back to forest. Nature all the time is endeavouring to win back the area to forest, and in a district of fairly good soil and heavy rainfall the advantage is all with the secondary growth. On areas where an intensely hot fire of the felled forest is secured the germ of the forest is entirely destroyed, and it is not until such time as seeds migrate on to the area that we see evidence of the forest re-establishment. In these latter areas it will be obvious that the grass-seeds sown on the forest-burn will have an almost undisputed reign, whereas that seed sown where the germ of the forest has not been killed will have immediate competition, and unless special judicious management is meted out the grasses sown have no hope of successfully competing with the uprising secondary-forest growth. Very few forest-burns within the above counties are sufficiently hot to kill the germ of the secondary forest.

According to the heat of the burn and subsequent stock manipulation, the class of the secondary growth varies: (*a*) With a light burn and virtually no stocking, bracken, soft fern, wineberry, fuchsia, and lacebark predominate; (*b*) where the conditions are wet and the soil loose, usually carrying a mass of pukahu, and generally at higher elevations, soft fern usually predominates; (*c*) where the conditions are somewhat dry and the soil light and friable, and where only light cattle-stocking has been the rule, bracken and hard fern predominate; (*d*) where the bracken-fern growth has been largely kept under for some years, mainly by sheep, and where close and continuous grazing has been practised, hard fern and hutiwai (piripiri) are often extremely prevalent; (*e*) where the soils are poor, or where the fertility has been reduced by close and continuous grazing, and where an open sward prevails, manuka asserts itself—it may reappear rapidly on country previously carrying manuka, or it may follow as a subsequent association over hard-fern areas.

EXTENT OF DETERIORATION.

In the district under review there are (excluding soldiers' lands) about 1,990 Crown holdings, with a total area of 874,700 acres. Of these holdings, 75, with a total area of 42,905 acres, have been abandoned. The percentage of holdings abandoned is 3·77, and the percentage of area abandoned 4·9. It is impossible to obtain accurate information regarding the area and proportion of deteriorated lands over the whole area. The following statement is compiled from circulars returned by 310 settlers in the various counties, and may be taken as an approximate average and a fair estimate: Number of settlers who sent in statements, 310; total area occupied, 165,220 acres; area felled and grassed, 112,250 acres; area fairly clean pasture, 68,341 acres; area in second growth, 43,909 acres. The proportion of the reverted country to area felled and grassed is 39·12 per cent.; the proportion of country in fairly clean pasture is 60·88 per cent. Taking these figures as affording a fair average over the whole of the Crown holdings in the counties under review, we estimate that the total area of reverted country is 232,500 acres.

CAUSES OF DETERIORATION.

We consider the factors most potent in the bringing-about of this deterioration are as follows:—

(*a.*) *The wet climatic conditions prevailing, preventing hot burns—primary or secondary—and favouring a very strong and rapid growth of fern, &c.*

Climate is a big factor in the breaking-in of any hill country in New Zealand. The wetter and the milder the climate, the more difficult breaking-in operations become. In the first place, so much depends upon the initial burn, for unless a hot burn is secured the seeds and spores of the secondary growth, well and truly sown on the forest-floor long before the forest is felled, remain alive, and from these seeds and spores plants establish during the winter following the burn. In every shaded place where the heat of the fire has not penetrated, around logs, stumps, and in crevices, are myriads of young ferns—bracken fern, hard fern, and soft fern—in the prothallus and young sporophyte stages, and over the burn in general wineberry, fuchsia, &c., may come up quite

thickly. Thus right from the offset the grasses and clover sown have to compete with a strong volunteer growth. In a light burn, also, many logs are left on the ground, making stocking by either cattle or sheep difficult or dangerous unless very high costs are entailed in the tracking and logging-up of the burn.

A wet climate not only induces secondary growth, but also makes the control of that secondary growth difficult. Of the kinds of secondary growth that are most troublesome in the above counties, hard fern and soft fern in particular are surface-rooting, and if only a hot fire can be secured over this class the surface stolons are easily killed, and then that particular growth ceases to trouble. Again, shade is not inducive to the spread of any of those grasses and clovers which would migrate and form a turf over the country. Particularly is this true of danthonia. To ensure danthonia to spread, light must be allowed into the crown of the plant; and, without a doubt, where secondary growth is troublesome the cheapest way of removing the shade of the secondary growth is by the firestick. In a wet climate where the firestick cannot be satisfactorily used, then the more expensive implement, cattle, or the slashhook, must be employed to effect the removal of the shade of the secondary growth so that the danthonia and other grasses may spread.

(*b.*) *Insufficient fencing of the country, so that controlled stocking, particularly by cattle, could not be carried out.*

In most instances throughout the above counties the areas of forest felled at any one time have been on the large size compared with the ability of the settler to fence and sufficiently stock the area felled. As before stated, the germ of the secondary growth survives in most instances the heat of the fire. The grasses sown have this growth to compete with; and it must be said that we have in New Zealand at the present time no combination of pasture plants which in themselves are sufficiently aggressive to swamp out secondary growth. The two great factors in weed-control in our grasslands are (1) the formation of a close and continuous grass sward, and (2) the judicious feeding-down of that sward by different classes of stock. Stock judiciously managed are really the most potent agents in the control of weeds, and particularly is this true of cattle. On the ability or otherwise of the settler to stock his new burn with cattle depends, in nine cases out of ten, success or failure. Most of the ferns take, from spores, two to three years before they form anything like adult plants. During this period the treading of the cattle plays havoc with the young plants, and if only the whole of the surface could be cattle-tramped during the first few years there would be little fern-growth on that area. The presence of innumerable logs and stumps precludes this possibility, but the principle holds good for all parts of the burn that may be tramped by cattle. Cattle, again, consolidate the country and make possible, for grass, pukahu areas and other light spongy soils where, without the consolidation, the grasses simply wither off, leaving the area open to weeds. To effect this consolidation and to tread out the establishing ferns, &c., a heavy cattle-stocking is necessary; and farms have been visited where from one to two cattle to the acre for short periods have been maintained on the new burn during the first two or three years.

This gives some idea of the cattle-power necessary on certain areas; and unless the burns are fenced into comparatively small areas such

cattle-stocking is an impossibility. Again, many burns are not fenced at all from the neighbouring unfelled portion, and thus the settler has no control at all over his cattle, and as soon as the harder winter conditions come on, or as soon as the feed amongst the secondary growth becomes scarce, the cattle are liable to take to the bush. Again, stock of almost all descriptions will always hang on the warmer slopes or where the feed is sweetest, and it is not until these areas are fenced off from the shady or rougher portions that stock may be kept on these latter places. In order to bring back the deteriorated lands, fencing is an essential. No definite size of the paddock can be given, as this varies according to the size of the holding and to the cattle-power that the settler can bring to bear on any one area at the one time. Roughly speaking, 10 per cent. of the holding would represent the size of a good workable paddock. Thus on a 1,000-acre place the maximum paddock would be not more than 100 acres, and on a 500-acre place 50 acres would represent about the largest paddock that could be effectively worked. The secret of pasture maintenance and improvement, and of secondary-growth control, lies in the ability of the settler to heavily stock the area for a short period—to clear it up rapidly and then to spell. This intermittent hard grazing and spelling is not possible unless the farm is adequately fenced.

(*c.*) *Injudicious stocking; close and continuous grazing by sheep, failure to spell the country.*

It may be laid down as a fairly definite rule that close and continuous grazing, particularly by sheep, leads to an early running-out of the first-class grasses and clovers, and to an incoming of either low-fertility-demanding and light-loving grasses, such as danthonia and brown-top, or weeds, such as catsear, hawkweed, cudweed, &c., or hard fern, hutiwai, and manuka. In the country under consideration, in view of the light burn and loose nature of the country, it would appear that the stocking has been too much with sheep and not enough with cattle. Once the secondary growth makes headway, sheep will avoid those places where it is growing, but will keep close-grazed the grassed areas. The spread of hard fern, hutiwai, &c., is greatly encouraged through baring the grass turf to the ground. Sheep, no matter how forced, will not break into the patches of hard fern, &c. Crushing with sheep, therefore, but adds to the deterioration, inasmuch as, while little damage is done to the secondary growth, the heart is eaten out of the grasses and these become weaker and weaker. Cattle break into the secondary growth, and owing to their not being such close grazers as sheep the pasture grasses are not so weakened. The ewes and the dairy cows are harder on the country than are dry stock, and the former class of stock cannot be forced to crush out secondary growth, or to clean up rough pasturage, in the same way as can the latter. The change to dairying forced on many settlers during the slump has been attended with deterioration of virtually all the steeper and more difficult portions of the farm.

(*d.*) *Sowing of grasses and clovers not wholly adapted to the country.*

In the early days of felling and sowing country in the above counties the grasses mainly used were rye-grass, cocksfoot, red and white clover, with a good sprinkling in some cases of timothy, crested dogstail, meadow-foxtail, Poa trivialis, Poa pratensis, and alsike. Many

settlers still pin their faith to the cocksfoot and other first-class grasses, but there is a big leaning at the present time towards certain of the second-rate grasses and clovers, such as Danthonia pilosa, brown-top, and Lotus major; and paspalum on certain of the warmer slopes is advocated.

Excepting where areas have been very carefully farmed, or where the soil naturally is somewhat better, or where top-dressing has been practised, it must be said that the first-class English grasses and clovers are not holding. The rye-grass held good for two or three years and then it dwindled, leaving the cocksfoot as the dominant grass. Under certain conditions of grazing, the cocksfoot, associated with Poa pratensis, crested dogstail, and white clover (generally with a good deal of Yorkshire fog), persists, and just so long as the surface-soil fertility remains up to a certain standard this sward may be kept almost indefinitely; but under the system of hard grazing, generally close and continuous, by sheep the sward opens up and the pasture becomes a prey to weeds, unless such grasses as brown-top and danthonia are present and are spreading over the areas.

In the choice of species of grasses and clovers to constitute the pasture sward the farmer has two alternatives: (i) To use only the first-class grasses and clovers—mainly rye-grass, cocksfoot, crested dogstail, Poa pratensis, white clover—and by a system of spelling or by manuring maintain the fertility of the country so that these species are kept sufficiently vigorous to maintain a close cover over the whole of the hillside; or (ii) to use in addition to the above species grasses and clovers which will form a close turf over the country even though the soil-fertility may be considerably reduced—such additional grasses are Danthonia pilosa, brown-top, New Zealand rice-grass (*microlaena*), paspalum, ratstail, Lotus major, Lotus hispidus, subterranean clover, yarrow, and suckling-clover.

The first-mentioned grasses and clovers, provided they are kept strong and vigorous, will beat the ones below in production, but the cost of maintenance of fertility in order to keep them going will in most cases be extremely high, and often impracticable. More cattle will be necessary, more spelling of the country, which means more fencing, or artificial manures will have to be liberally applied. Once a sward of brown-top, danthonia, New Zealand rice-grass, ratstail, paspalum, &c., becomes established the country is cheap to maintain, and on hard and difficult country it would appear a sounder proposition to accept the lower-producing yet less costly sward rather than to attempt to supply the demands of higher-fertility-requiring grasses and clovers. Few hill-country farmers in other parts of New Zealand have managed to retain intact the first-class English-grass sward. Almost everywhere one sees creeping in one or another of the low-fertility-demanding grasses and clovers. This fact speaks for itself, for there is no doubt that if only the first-class grasses are kept growing strong and vigorous there is no fear of invasion of that sward by the lower-producing, inferior grasses. The maintenance of fertility is the decisive factor in regulating the composition of any pasture turf. Where the costs of fertility-maintenance are high, it is better to accept the second-rate, lower-fertility-demanding grasses and clovers; and where soil conditions are poor, and fertility upbuilding and maintenance are impossible owing to the topography and inaccessibility of the country, the acceptance of these second-rate grasses is the only safe course.

(*e.*) *Depletion of fertility.*

According to the standard of fertility maintained so will the composition of the pasture vary. The first-class grasses and clovers require a high standard of fertility, the second-class grasses and clovers a lower standard. Any farming practice that tends to reduce fertility has a deleterious effect upon the pasture sward. In the above counties, while the fertility due to the humus of the forest and the potash lasted, the rye-grass, cocksfoot, clovers, &c., grew luxuriantly. We feel that a good deal of the deterioration in the older pastures is the result of a gradual reduction in the surface fertility of the soil, brought about by close and continuous grazing, and by natural loss of plant-food by leaching, due to the constant rain and loose nature of the soil.

Indirectly, the following causes also are to some extent responsible for the deterioration :—

(*f.*) *Boom and slump periods.*

During the war period, and onwards to the height of the land boom, labour, grass-seed, and fencing-wire, and also stock, were very dear. This deterred many settlers from going on with improvements and purchasing stock, and those who went on with improvements during that period did so largely on borrowed money and greatly increased the indebtedness of their holdings. When the slump came many settlers were forced to sell their stock at heavy loss, and were unable, owing to lack of funds or credit, to purchase other stock, and in consequence second growth was allowed to grow unchecked. Even settlers who had their farms stocked received such low returns from them that they were unable to afford expenditure on improvement and maintenance.

(*g.*) *High maintenance costs, these being in most cases too high for the unfinancial settler to keep up and live.*

The felling of the natural forest, the surface-sowing of the seed, and the fencing are by no means the last cost in the farming of hill country, and particularly is this true of virtually all the country in the above counties. The cost of maintenance is a most important economic factor to be considered, for it is not until such cost has been accurately gauged that one can get any idea of the net earning-power of the land. In the older forest country, such as that of the Wairarapa, Hawke's Bay, Gisborne district, and that between Palmerston North and Taihape, when the forest was felled and the land grassed and fenced the settler's troubles were virtually at an end, as there was little or no secondary growth to contend with, and that which did come away was comparatively easily dealt with. From these lands, therefore, production has been maintained, and the maintenance costs have kept comparatively low, and could in most cases easily be met. In the case of the lands under our consideration the conditions are very different : the running-out of the grasses sown, and their replacement by fern and other rubbish, meant an early reduction in the profits of these lands, and throughout maintenance costs were steadily increasing. Where capital was available and judiciously applied the maintenance costs could be met before deterioration went very far, but on those farms where little or no money was available for maintenance the conditions went from bad to worse.

Any country troubled with secondary growth, and where that secondary growth cannot be regularly burnt, is expensive to get into grass and maintain. To ensure a pasture sward on any hill country the secondary growth, where any appears, must be periodically removed until such time as a close turf of permanent grasses and clovers is secured.

No grass turf will thrive well under dense shade, and particularly is this true of danthonia. On second-class hill country, until secondary growth is got rid of, a danthonia sward undoubtedly should be the objective. This means that in one way and another all shade-making growth must be cleared off. Where possible, the cheapest and quickest way of effecting this is by firing the area. Thousands of acres in New Zealand have been brought into danthonia by means of the firestick. Each fire lets in more light, and the danthonia spreads, and in many cases no reseeding is necessary. In the case of the country under consideration it is not possible regularly to fire the areas, and consequently sunlight has to be let in by more expensive methods—namely, by the use of cattle or with the slashhook. The danthonia or the brown-top sward existing at the present time on other hill-country areas of the North and in the South Island may be said to have been got very cheaply, and in many instances practically at no cost to the farmer at all. Over the country we are considering the danthonia sward will cost a good deal to become general, because of the cattle necessary, and inability to burn. Also, there is more resowing of seed necessary, and an inclusion of other grasses in the mixture that will tend to cover the ground until such time as the danthonia spreads and becomes general. Danthonia even under favourable conditions is slow to spread, and in very few places has a sward of this grass been secured in under ten years. Sowing of danthonia alone, therefore, is not a sound proposition where the return of secondary growth is rapid. Crested dogstail, brown-top, and Lotus major particularly, besides other grasses and clovers, should accompany all danthonia-sowings in the above counties. The seed of certain of these is expensive, which again adds to the maintenance costs of keeping that country clean.

(*h.*) *Lack of knowledge of local conditions.*

There is no doubt that the peculiar local conditions prevailing in the above counties upset the calculations of many settlers, even those of wide experience in the breaking-in and farming of other hill country in New Zealand—Hawke's Bay, Wairarapa, Rangitikei, &c. The forest indications and the early productivity gave promise that the country would break in well and would rank equal to or better than such hill country in other parts. The settlers went to work and felled the forest, and sowed the same seed-mixture that they were accustomed to in the district of their previous experience. Stocking was carried out in much the same way—namely, largely with sheep —and little fencing was done. Even where areas were well fenced the importance of cattle was not recognized. After some years the English grasses went out, *as they also have done in most other hill country in New Zealand;* but instead of the vacant spaces in the pasture being seized upon by danthonia, brown-top, &c., which has happened in most other hill country, these became filled by pasture weeds, hutiwai, ferns, and scrub. We think failure to foresee this eventuality, and lack of capital to meet the eventuality when it arose, have helped in the present deterioration.

(*i.*) *High rental values and high unimproved values.*

The overestimation of the capabilities of the country, and the high goodwills paid on transfer since about 1908, have in many cases led to excessive rental values being credited to the land, and in consequence an excessive percentage of the returns that could otherwise have gone into improvements when the secondary growth was in its initial stages had to be swallowed up in meeting rent.

(*j.*) *Difficulty of providing winter feed.*

The difficulty of wintering stock at the present time, with so much steep country and so much still in the unstumped condition, is very manifest in certain blocks of country that were visited. Failure to carry sufficient cattle over the winter for the spring requirements is a big factor in the country having reverted so badly. The buying of cattle in the spring and having to sell again in the autumn, according to evidence given, resulted in a direct financial loss to the settler. The heavy death-rate of stock recorded in certain places is due in the main to their foraging in dangerous places, as the feed of the safer country gives out during the winter. It is essential that these losses through having to buy in the spring and sell in the autumn should be eliminated as much as possible by growing winter feed on any plough-able areas available, and by conserving feed by shutting up certain paddocks in the autumn.

(*k.*) *Aspect and steepness of country.*

The shady slopes and the steep, rough places are the first areas on the burn to revert to secondary growth. Both are alike in that stock avoid grazing there while they have access to sunny slopes or to easier country along the foothills.

(*l.*) *Lack of formed access.*

Bad access in the past, and in some cases at present, contributes to the settler's difficulties, increasing costs of development and expenses of running the farm.

(*m.*) *Lack of capital.*

It was almost universally said in statements made by settlers that lack of capital was responsible for the greater part of their trouble. Cheap money was said to be the crying need of the country. They realized now that more fencing had to be erected, that more cattle had to be kept, that more seed had to be sown, and that manure, where possible, had to be supplied. The question of raising money for the purchase of these was the great stumbling-block, for in many instances the land was already heavily loaded and lending institutions had tightened up considerably. A good deal of money must yet be spent on the country, and in the case of badly deteriorated areas there is little inducement given for the investment of private money. Undoubtedly the tightening-up of the money-market to these settlers has deterred much good work from being accomplished.

SIZE OF HOLDINGS.

In the case of the unploughable hilly land we consider that many of the holdings are too small to enable the settlers to make a reasonable living, and that the same class of land can be improved and worked more economically in larger holdings, the capital expenditure in the

matter of fencing, building, &c., being considerably less per acre on larger holdings. We are of opinion that in the case of the land above described the minimum area generally should be large enough to winter about one thousand mixed sheep and one cattle-beast to 5 acres. We recommend that provision be made for the reclassification of these lands, and also of the freehold lands of similar description held under title subject to Part XIII of the Land Act, 1908, with a view to allowing an increase in the area of holdings where desirable. In the case of the ploughable lands, either bush or other country, we consider the present areas are sufficient. It would, however, be a great benefit to the settler who has at present only steep, unploughable land if he could secure in addition a piece of ploughable land. This would enable him to carry stock through the winter which he requires in the spring to keep his country in order.

In regard to areas of holdings which by reason of their poor quality and extreme steepness cannot at present be profitably improved, it would not be advisable in most instances to sever such portions, which are usually steep, high country at the back of the holding, and if severed would have no access. They would also be liable to become a breeding-ground for pigs and noxious weeds. The settler would control them as far as pigs and noxious weeds were concerned, and derive benefit from them as a source of supply of fencing-material and firewood. The planting of these portions by the settler might be worth consideration. We think, therefore, the best policy would be not to sever steep and unprofitable portions from the holding, but to reduce the rental of the unprofitable portions to a nominal figure and allow the settler to retain them. There are instances where these rough and poor portions adjoin Crown reserves, and where good fencing boundaries on severance would be obtainable. Provision might be made for severance in such instances.

ACCESS AND COST OF ROADING.

Part of the lessees' difficulty has been, and is still, due to bad roads, or none at all, and the distance of the holdings from railway-stations or distributing-centres. This adds to the cost of everything that goes on the place; and, where top-dressing is found to be profitable, good roads will lessen the cost of and encourage the use of manures. They would also in many parts enable fat lambs to be sent to market without waste, by motor-lorry, and thus enable the farmer to secure larger returns. It is considered that increased road subsidies to certain counties should be made. Some witnesses suggested that the payment of "thirds" should be continued for longer periods, and this would help to some extent.

The road-access question has always been somewhat of a stumbling-block. In an earlier period it was considered advisable to delay road-making to enable the settlers on the land to earn money; but in this class of country, where larger holdings should predominate, it is probable that a better policy would have been to do most of the roading before selection, as the settler usually has enough to do on his farm. Prior to 1913 it was not customary to load for roading at a greater rate than 5s. per acre, but in rough country this sum is quite inadequate. Provision has since been made for increasing the loading.

The area of occupied holdings, taking in both improved and unimproved land, in ten of these counties is approximately 2,792,000 acres, and an approximate estimate of the cost, including bridges but

excluding metalling, of completed roads, is £3,020,000—much of them done more cheaply than at present. To complete unformed portions £1,740,000 would be required: this gives an average of £1 14s. per acre of occupied land. Some of this high cost is due to having to carry the roads through private and Native land as well as Crown land to reach the occupied Crown land. Prior to the war, roading-costs, without metalling, ran from £150 on the easiest country to £1,200 per mile on the roughest. These costs may now be safely doubled.

This gives an idea of the large sum required to road this class of country, and indicates the necessity of economy in the mileage. This does not mean that properties should always be large: they may be small on roads that are necessary; but extra roading should be avoided, if larger subdivisions will lessen it, where the class of land does not justify the rating necessary to pay interest on loans and maintenance. Many settlers urged the need of greater financial assistance than the present limit of £5,000 loan-money towards metalling in undeveloped counties where road-metal is scarce and consequently costly.

The improving of communication in these backblocks would assist in making the social side of the life more attractive, and induce more married men with families to take land; at present the lack of good roads, and the difficulty in obtaining adequate educational facilities, make residence on this class of land hard for the womenfolk.

We would recommend that in newly settled districts like these under consideration, where a large amount of developmental work has to be done, where roading is difficult and costly, and metal scarce, it would be reasonable to give local bodies a larger limit of borrowing-power from the State Advances Department than older-settled districts, and a more generous contribution in the way of subsidies for metalling—say, £2 for £1, instead of £1 for £1 as at present.

It is hopeless a settler trying to succeed without a 12 ft. road to his property, and the Government should provide this or say definitely that it will not do so. In the latter case some compensating arrangement should be made with the settler who has been patiently waiting for his access for so many years; in some few cases, twenty years after the land has been alienated, some of the roads are still unformed.

SUITABILITY OF THE LANDS FOR SETTLEMENT.

In view of the large amount of capital already spent in felling, grassing, and roading, &c., caution should be used before abandoning any of this class of country. In our opinion a small portion of the poorest and roughest country is not worth trying to farm. At the same time, the second-class grasses have not yet had sufficient trial, and it is desirable that work of an experimental nature be carried out on this class of country by the Crown. In the meantime the disposal of this class of land should be held in abeyance. The question of deterioration has been dealt with under that heading.

NECESSITY FOR REVALUATION.

Revaluation is advisable in consequence of the change in circumstances since many of the lands were selected. When this took place in many cases the difficulty of maintaining fertility and controlling second growth, and the liability to reduction in carrying-capacity, were not generally recognized, as the forest indications were similar

to those in districts where country turned out well and was broken in with much less difficulty. Costs of development have also increased out of proportion to the returns. Bushfelling, for instance, has risen from £1 5s. to £2 or over, and fencing in the same proportion to £2 or more per chain.

One factor that induced high valuations was the goodwills that in instances were paid on transfer. Tenants complained of want of uniformity in Crown rental valuations. Generally, the rental values previous to 1908 were not unduly high, and it is not apprehended that much reduction will be necessary in the case of blocks opened prior to that date. In the case of blocks opened subsequently to that date, values of some blocks should probably be reduced considerably. The fact of the country being opened up more, and the experience of intervening years, will render practicable more uniform and reasonable valuations. The lowering of rents on revaluation will not amount to enough to remedy the situation altogether, but it will afford a measure of relief to many harassed settlers.

Among the causes justifying low rental valuations on these lands are the liability to second growth, and the high cost of maintaining pasture through the loss of cattle used for crushing in earlier stages; the lower price for bush wool; and the lack of formed access, making the cost of everything high at the start, thus bearing hardly on men of small means. There is also the liability of failure of burns in a wet season. The cost of medical attention is another item that occasionally bears heavily on pioneer settlers. Much of the lands under consideration was cleared and sown when costs were much lower; but, since about 1912, development charges have been rising rapidly, and it is now estimated that to properly fell, sow, fence, erect buildings, and otherwise improve bush land will cost about £6 or more per acre.

POSTPONEMENTS AND REMISSIONS OF RENT.

We are of opinion that in many cases remissions of rent for any period up to five years will be required, and also think that actual remissions for a period would be better than postponements of larger amounts for longer terms. Such should only be given subject to the amount remitted being spent either on fencing, manuring, seeds, clearing, or other land-improvements to the satisfaction of the Department. In many instances the settlers are so heavily involved that any assistance is futile until a large proportion of their indebtedness is written off. Any assistance given should be contingent upon the mortgagees, State or private, reducing mortgages or remitting or lowering the rate of interest. In granting assistance of any kind the merits of each individual case would have to be carefully considered.

EXTENT TO WHICH CROWN TENANTS HAVE MORTGAGED THEIR HOLDINGS.

In the district under review there are (excluding soldiers' land) about 1,990 Crown holdings, with a total area of 874,700 acres. Of these holdings, 75, with a total area of 42,905 acres, have been abandoned. The percentage of holdings abandoned is 3·77, and the percentage of area abandoned 4·9. It is impossible to obtain accurate information regarding the area and proportion of deteriorated lands and the financial position of settlers over the whole area. The following statement is compiled from circulars returned by 310 settlers in the

various counties, and may be taken as an approximate average and accepted as a fair basis for estimation :—

Number of settlers who sent in statements	310
	Acres.
Total area occupied	165,220
Area felled and cleared	122,250
Area fairly clean	68,341
Area in second growth	43,909
	£
Government loans—Stock	9,275
Land	226,996
Private loans—Stock	67,679
Land	221,818

	£ s. d.
Advances on land per acre over total area (165,220 acres)—	
By State Departments	1 7 6
From other sources	1 6 10
Total indebtedness per acre on land	2 14 4
Advances on stock, per acre—	
By State Departments	0 1 1
From other sources	0 8 2
Total indebtedness per acre over total area (165,220 acres)	£3 3 7

	£ s. d.	£ s. d.
Advances per acre on total area of felled land (112,250 acres)—		
By State Departments	2 0 5	0 1 7
By private firms	1 19 9	0 12 0
Total indebtedness per acre	£4 0 2	£0 13 7

	£ s. d.
Total indebtedness per acre on 68,341 acres fairly clean land, including stock	7 14 0
	Per Cent.
Proportion of the reverted country to area felled and grassed	39·12
Proportion of the country fairly clean to area felled and grassed	60·88

Money lent by the State, if on the same ratio as above, on an area of 874,700 acres would be £1,209,000 ; and from private sources an almost similar amount, £1,174,000, is involved. This makes a total of £2,383,000 ; and to this must be added £493,500 for stock mortgages. Besides money lent on Crown holdings, different Government Departments have securities in the same districts on freeholds and other tenures, so that the Government is concerned with this phase of the question as well, where it guarantees such funds.

METHODS OF DEALING WITH SECONDARY GROWTH.

There are four main methods of dealing with the secondary-growth problem, which methods more or less overlap and are interdependent the one on another. These are—(i) The use of cattle, and necessary fencing to control the cattle-stocking ; (ii) resowing with low-fertility-demanding grasses ; (iii) top-dressing with artificial manures, spelling, &c. ; (iv) direct manual labour in cutting, burning, &c.

The use of cattle, the need of fencing, the advisability of using low-fertility-demanding grasses have been previously discussed. The wonderful results that have followed the top-dressing of worn-out grassland in many parts of New Zealand have led to a general idea that in top-dressing lies the salvation of the secondary-growth grasslands of

the North. There is no doubt that top-dressing, rationally carried out, will prove of great value, but just how, when, and where top-dressing should be done is hard to answer satisfactorily. Top-dressing of weak grassland and of any portions that are moderately well grassed appears to the Committee to be sound under nearly all circumstances. Top-dressing will increase the feed produced and thereby increase the stock carried. Top-dressing increases palatability, and therefore it acts as a draw to stock. If stock can be drawn on to secondary growth in increasing numbers by top-dressing, then top-dressing becomes a most important factor for the control of secondary growth. On certain of the steep country where the pasture has virtually gone, several applications of manures will have to be made before a marked improvement of the country is shown. This will involve a heavy expenditure, which the settler in his present condition can hardly stand. Manual labour is necessary to deal with manuka, wineberry, &c., that cannot be kept down by stock.

COSTS OF GETTING REVERTED COUNTRY BACK.

Costs of getting the reverted country back into profit are extremely difficult to arrive at, as so few settlers have tackled and successfully grassed large areas that had reverted. The costs of regrassing also depend very largely on the seasons experienced and on the class and density of the growth to be dealt with. There is no doubt that if the country were swept over by a Raetihi fire the costs of getting the country back into grass would be considerably reduced. As the seasons are at present, a good deal will have to be spent actually in the cutting of secondary growth.

	£ s. d.		£ s. d.
Felling manuka, wineberry, &c. (£1 5s. to £1 15s. per acre) ..	0 2 6	to	0 3 6
Seeding	1 5 0		1 5 0
Fencing	0 7 6	to	0 15 0
Average cost per acre ..	£1 15 0	to	£2 3 6

Given a really dry burning season, a great portion of the reverted country could be brought back to profitable condition for little more than the cost of grass-seeding and repairs to fencing.

Each succeeding year up to about the sixth year there will be a small recurring cost for the felling of reappearing manuka, &c. Every four to six years hard-fern patches will in all probability need burning and a further sowing of seed. With danthonia, Lotus major, and brown-top spreading into the patches, these costs will probably be greatly reduced as time goes on.

Certain of the bracken-fern areas are being brought in by crushing with cattle, but the expenditure in connection with cattle losses is almost impossible to estimate on the data secured. Top-dressing as a factor in control, with manures and cartage at their present figures, will mean a high annual expenditure on the land. For the first application only little extra stock might be carried on the poorer, steeper, run-out portions. Two hundredweight to 2½ cwt. manure per acre applied to the land annually would cost about £1 per acre. The first two or three years of top-dressing the poorer run-out lands must

be regarded as a necessary expenditure to get the land back to form. Once the sward is well established again, top-dressing, to be an economic practice, should then pay for itself and show a profit in the increased stock carried. On the better papa slopes and on any fairly well grassed country top-dressing undoubtedly would pay for itself right from the offset.

FURTHER RECOMMENDATIONS.

1. *Extension of Time to freehold O.R.P. Holdings.*—The time allowed under the Act to freehold a number of these holdings will shortly expire, and some settlers stated that under their present financial circumstances they are unable to exercise the right of purchase. We recommend that consideration be given to extending this right for a period of, say, ten years.

2. *Financial Assistance.*—In addition to remissions of rent for specified periods, other financial assistance is necessary. In a great many cases many settlers have not been able to meet their obligations as far as their rent and interest are concerned. We recommend that a special fund should be provided to assist settlers in the purchase of commodities such as fencing-wire, grass-seed, manures—all of which are essentials in the bringing-back of these lands.

3. *Royalty for Destruction of Pigs.*—There were in some districts numerous complaints about the depredations of wild pigs in destroying lambs and rooting up good pastures, and we recommend that the payment of 1s. per snout, already paid in some districts, should be made general throughout the whole district under consideration, and for the whole year round.

4. *Free Railage on Manures.*—Much could be done to help settlement on these lands if settlers were enabled to manure. The cheaper the landed costs of manures the more will be used; and to encourage their greater use we recommend that manures be carried free of charge on the railways for *bona fide* settlers in the areas under consideration.

5. *Fencing Boundaries adjoining Crown Reserves.*—We recommend that some consideration be given to settlers whose lands adjoin Crown reserves in the matter of boundary-fences. This consideration could be given by an allowance in the rental, or by actual financial assistance in the erection.

6. *Research Work.*—We recommend that the Government assist generally by carrying out research as outlined below; and by lectures, field demonstrations, pamphlets, &c., do all in its power to gain and disseminate knowledge on the best and most profitable ways of farming these lands.

It was patent at the meetings and on the settlers' farms that the settlers themselves were seeking to gain information as well as to give. This problem of grassing steep forested country is comparatively new to the pastoral world, and the wonder of it is that so much of our hill country has been so successfully grassed. Up to the present the settlers themselves have worked out their own salvation. When the land was taken up originally neither the Department of Agriculture nor the Department of Lands had any exact information to give on grassing and managing the hill-country lands of New Zealand. Recently experiments have been started in a small way in the Whangamomona County, and while these in themselves are excellent, yet the whole question of hill-country farm management

and farm economics should be the subject of an exhaustive research by the Government. Experimental work on hill country is not a matter of small plots: whole paddocks, and in certain instances whole farms, should be taken over and treated and kept under close supervision by scientific men trained to the work.

Some of the leading problems calling for investigation are—(i) Study of exact conditions that determine dominance and succession in secondary growth; (ii) an exact study of all known pasture species on the various soil types, and a trying-out of new and additional species, should be undertaken; (iii) thorough study of the economics of cattle as a means of secondary-growth control; (iv) study of general methods of management; (v) costs of maintaining the country; (vi) study of methods of fertility upkeep.

The hill grasslands comprise some 11,000,000 acres, approximately 75 per cent. of the total deforested lands in New Zealand. Of this area during the last eight years, according to official statistics, approximately 1,100,000 additional acres have reverted to fern, scrub, and secondary growth. To try to stay this deterioration, expenditure on research work is amply justified. Necessary funds and men should be forthcoming so that this work is in no way hampered, and provision should be made not only for the immediate future, but for a period extending over not less than ten years, so that a sustained effort at carrying out this important piece of work could be made. A few good men forming a small branch of the Fields Division of the Department of Agriculture, working in conjunction with the field officers of the Lands Department, could do invaluable service to the country at the present time.

POSSIBILITIES OF THE COUNTRY.

The report, as set out above, is necessarily bristling with the word "deterioration," and the Committee feels that some injustice may be done the country as a whole without some word as to the possibilities of the country once it is shown that the area can be successfully brought back to grass. Generally speaking, it may be said that strong growth of secondary scrub, &c., tells of possibilities in the country rather than of impossibilities. The very factors that favour strong secondary growth alike favour good grass-growth once the sward is established and once the secondary growth is controlled. The country generally is well watered, and healthy for both sheep and cattle. A surprising feature in the deteriorated grasslands of many of the counties is the really high carrying-capacity of the land actually carrying grass. We think it is not too much to say that, once the country is sufficiently fenced and the secondary growth cleaned off, one to one and a half mixed sheep per acre, besides cattle, is not too high a carrying-capacity to expect over the majority of the country. With manuring, more could be carried. For some years the cost of maintenance will undoubtedly be high, but as the country ages, and as stumps, logs, pukahu, &c., rot away, difficulties and maintenance costs will gradually decrease—that is, just as long as the areas remain in occupation and the settler handles his country properly. Here and there are to be seen in a fairly clean condition successfully managed farms which stand out in contrast to much of the other land in the vicinity.

[NOTE.—An appendix to the foregoing report will be published in a later issue of the *Journal*.]

SEASONAL NOTES.

THE FARM.

SPRING CULTIVATION AND FORAGE CROPS.

As soon as the land is dry enough in August ploughing and general preparation for spring crops should be pushed along with a view to sowings during the latter part of the month or early in September.

Special hay or ensilage crops: Where the situation is warm and likely to suffer from dry weather early in summer it is good policy to get these crops in towards the end of August, but in most situations from the middle to the end of September is quite early enough. Suitable for this purpose are mixtures of Algerian oats or wheat with tares or peas—2 bushels of the cereal to 1 bushel of the legume. For spring sowing golden tares are the best, but if there is any difficulty in procuring these the ordinary grey tare is quite satisfactory. In peas Early Minto, Grey partridge, or Imperial blue may be used, their merits generally being in the order named. In localities where tares or peas do not grow very well it is advisable to sow 1½ bushels per acre. Suitable manures for this class of crop are basic super, or mixtures of super and Ephos, slag, or Nauru phosphate, at the rate of 1 cwt. to 3 cwt. per acre according to the condition of the land. If the land has been recently limed, super will probably be the best. Another suitable crop is Western Wolths and Italian rye-grass, 15 lb. each, together with 6 lb. of cow-grass.

Sheep feed: Oats and mustard (2½ bushels to 3 bushels of the former and 5 lb. or 6 lb. of the latter per acre) may be sown in August for ewes and lambs, to be fed before the first rape is ready. In Southland a mixture of Emerald rye-corn (2 bushels) and Western Wolths (12 lb.) has been found very useful.

WHEAT AND OATS.

The extremely wet conditions prevailing during June will have prevented the winter sowing of large areas of cereals in Canterbury. The land already prepared in most cases will have settled rather badly, and before drilling is carried out a deep cultivation will be necessary to permit of a good seed-bed and ample æration. Except in the milder districts near the coast, the sowing of wheat and oats should be left until favourable conditions in August and September The earlier spring sowing should be done while soil conditions will permit, and growers will be wise to use at least 1 cwt. per acre of high-grade superphosphate or basic super. The shorter period of growth of spring-sown crops calls for the use of these more soluble phosphates, as quick development of a good rooting-system to help in overcoming dry conditions which may set in is essential.

Later in August the rolling of autumn-sown crops should be carried out. Frost-lifted ground will dry out very quickly, and deprive the roots of that close contact with the soil which is necessary for enabling the plant to derive the maximum benefit. Rolling should be followed by harrowing in all cases, for once having compacted the soil it is just as desirable to prevent, as far as

possible, any loss of moisture by evaporation. The harrowing will provide the surface mulch which, itself being loose, will dry quickly, but will prevent further excessive evaporation from the lower soil. Excessive evaporation means loss of warmth as well as loss of moisture, and both require conservation in the spring.

PASTURES.

Quick returns for money invested in manures is always desirable, and if benefit from top-dressing is desired in the current season August should be the latest month for application. Preference should now be given to super, basic super, or a mixture of super and lime. Every farmer should be his own experimenter as far as is practicable, and no operation such as top-dressing should be done without having a strip or two in the paddock left free for comparative purposes.

Pastures should be given a thorough harrowing with the tripod or chain harrows during the coming month.

FEEDING-POINTS.

Where green forage crops have been provided they will prove of great value for cows that have come into profit early, also for newly lambed ewes. To make the best of the crop and ensure the best results from the stock, considerable care is necessary in feeding at this time of the year. When feeding off, the stock should only be allowed on the crop for twenty minutes to half an hour during the first few days; if the supply is ample this may be increased to one hour at the end of a week. If available, hay or some roughage should be fed before the stock are allowed on the green fodder; most stomach troubles will then be avoided.

Crops of Thousand-headed kale and Chou moellier are best cut and allowed to wilt for a day before being fed out. In this condition cows do better on the fodder, and the danger of red-water is avoided.

Mangolds make excellent feeding for both sheep and cattle, provided they have been properly ripened. It will often be found that they ripen unevenly, and care should be taken when carting out to select the ripest, throwing the green roots back and giving them a further chance to mature. When mangolds have been carted out on a field for ewes the latter will generally select the ripest roots themselves. Dairy cows should be started with 20 lb. per day, and this may be increased to 50 lb. or 60 lb. per day; any quantities over this are more or less wasted.

Hay should be fed before roots of any sort, but especially before mangolds. Care should be taken to feed roots on a clean pasture; the consumption of quantities of earth is bad for any animal.

MISCELLANEOUS.

Cultivation of lucerne may still be carried out to advantage during the coming month before any marked growth is made by the crop. Spring cultivation is particularly desirable after such an excessively wet period as has been experienced this winter in most districts.

A few pounds per acre of cow-grass distributed over autumn- or winter-sown wheat at this time will often be found very profitable, providing a fresh bite after harvest while cleaning up the stubbles and later to be ploughed in.

—Fields Division.

THE ORCHARD.

THE SPRAYING PROGRAMME.

WHEN these notes appear pruning operations should be well forward in order that other seasonal work may be carried out as it falls due. Spraying will be the most important work to be done during the next few months. Every grower should now be preparing his spraying programme, and, moreover, comparing it with the one of the previous year. The results obtained will enable him in some measure to amend and alter his programme to suit the conditions under which he is working. Where new and untried compounds are placed on the market, these should be treated with caution until such time as they have been proved by some reliable person or persons. The various specifics that have been in use and recommended for many years have stood the test of time, and in the main have given satisfaction. Moreover, they will (if used in an intelligent manner) control the various pests and diseases. The fact that at various times failure has resulted where the well-known spraying formulas have been used in no way reflects adversely upon their effectiveness. Although certain modifications may be necessary in time of application and strength at which to apply, the points which follow will serve as a guide for the next few months.

CONTROL OF FUNGOID DISEASES

For the control of fungoid diseases such as leaf-curl, shot-hole, bladder-plum, &c., all stone-fruit trees should be sprayed with bordeaux mixture (8–6–40) as soon as the buds commence to swell. Great care must be exercised in making the application in order that every portion of the trees shall be completely covered, paying particular attention to the young twigs. Bordeaux should be used immediately after it has been made, as it deteriorates rapidly, and is stated by competent authorities to have lost approximately 50 per cent. of its efficiency after standing eight hours. Apples and pears should receive an application of red oil (1 in 10 to 1 in 15) at the end of August or early in September. Pears should be sprayed first, as the buds are more liable to injury than those of the apple. Bordeaux will not control blister-mite on the pears, and it is therefore necessary for them to be sprayed with an insecticide for its control.

For the control of black-spot on pears the following applications of bordeaux should be given: 5–4–40 at tight-cluster, 4–4–40 at pink-cluster, 3–4–40 at petal-fall. As Winter Cole is rather subject to scorching, it should not receive bordeaux after the pink stage. This variety is not very subject to black-spot, therefore no harm will result by deleting bordeaux after the pink stage. On most varieties the last-named application will have to be repeated at intervals of from fourteen to twenty-eight days, according to the amount of infection threatening. As the spores of black-spot develop more rapidly under moist conditions than under dry, it will be necessary to make the applications more frequent when the weather is damp.

Apples will need the following applications of lime-sulphur for the control of spot, mildew, &c.: 1–10 to 1–15 at early green-tip, 1–40 at pink, 1–100 at petal-fall. Where it has not been possible to make the first application of lime-sulphur (1–10 to 1–15) it would be wise to substitute it with 1–25 at tight-cluster and then eliminate the pink.

spray. With those varieties very subject to spot, such as Delicious, Dougherty, Ballarat, &c., bordeaux (3–4–40) could be used at tight-cluster.

Complaints have been made that Cox's Orange and Delicious will fall heavily if sprayed with lime-sulphur at petal-fall. This may be overcome to a large extent by substituting a combination with atomic sulphur in either of the following formulas: $\frac{3}{4}$ gallon lime-sulphur, 4 lb. atomic sulphur, 100 gallons water; or $\frac{1}{2}$ gallon lime-sulphur, 7 lb. atomic sulphur, 100 gallons water. It has been demonstrated that atomic sulphur combined with lime-sulphur prevents burning.

To a large extent the control of all fungoid diseases should be of a preventive nature.

MANURING.

This is work that should be kept in view at the present season. The trees, being in permanent possession of the soil, take out year after year the same constituents. These need to be restored to the soil, otherwise it would soon become exhausted and poor results would be obtained. It has been definitely proved that judicious manuring pays well in all classes of production. If farmyard manure can be obtained it supplies all that is necessary. Where it cannot be procured artificial fertilizers can be used with good results. Superphosphate, sulphate of ammonia, and sulphate of potash will supply all that is required, using them in the ratio of three of the first to one each of the two others. This manure should be applied during August, in order that spring rains may take it down into the soil. Should the land be deficient in plant-food in the form of humus, this should be supplied in the form of cover-crops grown each season and ploughed under. This, together with an occasional dressing of lime, should keep the orchard-trees in good condition and enable them to bear consistent and regular crops of high-grade fruit.

—L. Paynter, Orchard Instructor, Christchurch.

CITRUS-CULTURE.

Harvesting.—Oranges (Poorman and sweet) should be harvested as ready. With both it is advisable to get good maturity. Many oranges are picked at the first tinge of yellow, but with sweet oranges this is too early to give good quality. A well-developed colour covering the whole surface is required before the fruit is ready to pick for the local market, while the real quality fruit for the best trade is that which is allowed to remain on the tree to fully mature. Poorman and marmalade oranges may be harvested when a fair proportion of colour is showing and good size attained. Where these varieties are being grown for sale as breakfast fruit more maturity on the tree will give better dessert quality and tend to increase the popularity of this fruit and its use for that purpose.

Planting.—All kinds of citrus-trees may be planted from now on. The essential factors are: (1) The soil should be in good order at time of planting—that is, not sticky; (2) the trees should be planted firmly, but the surface soil left loose; (3) the plants should be supported by a strong stake, inclined towards the prevailing wind; (4) the stake—not tree—should be bound with sacking or like material to prevent chafing; (5) long extensions or unshapely growth should be cut back to shape the tree and restore balance between top and roots, many of which have been destroyed as the trees were lifted.

Pruning.—The pruning advisable at this period will mainly consist of the removal of cross-wood, surplus growth, and worn-out parts. Cross-wood is, of course, to be avoided in any part of the tree-formation, as it gives rise to bark-chafe, with consequent check of sap to such parts—apart from the fact that injured wood provides a ready entry for borer. Surplus wood may usually be found on the inside of trees—soft, rank water-shoots and other adventitious growths which create a dense condition. With the orange their removal is not so important, for the fruit is carried round the fringe of the tree; but, even so, an open condition rather than density should be aimed at, as a circulation of air and easy access for sprays are desirable for keeping the tree healthy. With the lemon, as fruits are carried throughout the tree, a large area can only be kept in fruiting-condition by so keeping the tree open as to allow sunlight and air easy penetration throughout. Worn-out parts consist of twigs and branches which have become unduly extended. These should be shortened back to a well-placed lateral or small bud, to induce more desirable young growth. Also, short twigs which have fruited and show decline should be cut out clean to active wood, not only because they are of no further value, but because if allowed to remain they prove the usual point of borer-entry. Any branches which are inclined to sweep the ground should also be shortened back to give a good clearance—say, 18 in. at least. All cuts made on wood over $\frac{3}{4}$ in. in diameter should be coated with coal-tar. This is a good safeguard against decaying fungi and wood-rot, and well repays for the little extra labour involved.

—*W. H. Rice, Orchard Instructor, Auckland.*

POULTRY-KEEPING.

EXPORTATION OF EGGS.

The egg-export season being near at hand, a few hints regarding the class of egg most desired for the export trade may prove helpful. In this respect it may be mentioned that since the initiation of export two seasons ago there has been ample evidence to show that the great majority of poultry-keepers have much to learn in regard to collecting and forwarding their eggs to the grading-stores. With too many producers an egg is an egg and nothing more, there being little consideration given to its freshness or external appearance. Such methods of marketing eggs may pass for the local market, where there is no outside competition to contend against, but with the overseas trade it is entirely different. In the latter case our eggs have to face world-wide competition.

In the past two export seasons the great drawback has been the high overhead charges connected with preparation of the shipments. Had the great bulk of the eggs received at the grading-stores been in a fresh, clean condition, these charges would have been considerably reduced. As it was (especially at certain of the stores), more than 50 per cent. of the eggs proved to be unsuitable for export, and therefore had to be rejected. This was chiefly because they were stale or in a dirty condition. Indeed, it is safe to say that many of the lines referred to were never intended for export so far as the producers were

concerned. In the circumstances those in charge of the egg-collecting depots—namely, egg-circle agents and others—must share blame with the careless producer for the unsatisfactory state of affairs which existed.

If overhead charges are to be reduced to a minimum during the coming season, and the export trade is to be made really payable, it is of the first importance that those concerned shall appreciate the necessity of internal quality and of cleanliness. Notwithstanding the special care taken by the graders in sorting out the clean eggs from the dirty at the stores, an extract from a trade report regarding some of last season's shipments reads, "The shells were much cleaner than those of the 1923 shipments, although there is room for improvement along this line to compare with high grades from continental countries."

Those who intend exporting eggs during the coming season should secure from the Department a copy of Bulletin No. 106, which is supplied gratis and gives useful points for the guidance of producers regarding the exportation of eggs. Supplementary to this bulletin the points which follow may further assist towards the desired end.

Cleanliness.

Dirty eggs cause more trouble and annoyance at the grading-stores than practically all other things put together. To ensure clean eggs the nests and nesting-material should be kept clean; also, where possible, the hens should be confined to the house on wet days and when the runs are in a muddy state. Pine sawdust or, better still, clean sand are excellent nesting-materials, especially where kerosene-tins or nests without cracks are used. These act as an absorbent where the birds enter the nests with soiled feet, and tend to prevent the eggs from getting dirty. Another advantage in using sand or sawdust is that, should any adhere to the shell, it can be easily brushed off.

Eggs for export should not be washed. By means of a soft cloth damped with lukewarm water any dirt adhering to the shell can be easily removed. The egg should be rubbed as lightly as possible, so as not to remove the protective covering, which has much to do with its keeping-quality. Dirty cloths or dirty water should never be used, as they give the eggs an old, stale appearance. Eggs should be cleaned as soon after being collected as possible; the longer they are left the more difficult will it be to remove the dirt. Cleaning eggs is a slow process, and the poultry-keeper should aim to prevent having to clean them.

Eggs should never be put into the carriers until they are properly dry, as any dust on the fillers or trays will adhere to the shells, making them unsuitable for export. The fillers, flats, trays, &c., should be well dusted before the eggs are placed therein. Unless eggs are perfectly dry, newspaper should not be used in the packing process, as the printer's ink will adhere to the shells and spoil them for export.

Eggs intended for export should be packed in closely boarded carriers, not only in order to keep them free from dust during transit, but also as a preventive against the air-cell drying down. To guard against this they should also be stored in a cool place. It should not be forgotten that evaporation of moisture from the egg commences immediately after it is laid. Obviously, the cooler the place in which it is kept the slower will the drying-down process be.

Freshness.

Eggs for export should be strictly fresh, as after a week old they are apt to be rejected as stale. To ensure freshness—especially during warm weather—they should be frequently collected. Allowing eggs to be sat and trampled upon by several birds when visiting the nest to lay not only injures the content, but also has the effect of giving the shells a dirty, unsightly appearance.

Size of Eggs.

Generally speaking, throughout the country there is a tendency towards smaller eggs, and the chief reason for this is that sufficient care has not been taken to eliminate the small egg when selecting eggs for hatching-purposes. The desire for numbers instead of quality is largely responsible for this careless policy. In mating the breeders it is especially important to know that the male bird has come from a hen which laid a good-sized egg, for, however satisfactory may be the size of the eggs of the female, the progeny will probably fail to maintain a good egg-standard if the sire is the descendant of stock the eggs of which were of an undesirable size. It has to be remembered that the male bird influences perhaps hundreds of the progeny, whereas a hen will influence only the chickens which have come from the eggs she laid.

There could be no better means of correcting this undesirable tendency than by introducing a system of selling eggs according to their weight. Under the present crude system of marketing there is no inducement for a producer to breed for good-sized marketable eggs, obviously for the reason that he is not recompensed in money value for the trouble taken. I recently received a communication from a producer who stated that one strain of birds in his flock mostly laid eggs $2\frac{1}{4}$ oz. in weight, and asked what could be done by way of feeding or mating to reduce the size of the eggs produced, thus securing greater numbers from these particular birds. He pointed out that the local egg-circle gave the same price for eggs weighing $1\frac{3}{4}$ oz. as for $2\frac{1}{4}$ oz. product. Of course, I am not advocating the production of very large eggs, but the egg specially desired for the export trade—namely, 2 oz. in weight, or slightly over. It is true that the egg-laying competitions are doing a splendid work for the uplifting of the Dominion egg-standard, as in these tests no bird or pen of birds, as the case may be, that lays an undersized product is eligible for prize-money. So long, however, as eggs are sold by the count, irrespective of their size, and at an equal price, such must obviously help in no small way to undermine the object aimed at by those who control these competitions.

The worst feature connected with the small-egg question is that its production is not only being encouraged for the local market, but for the export trade as well. For instance, last year eggs weighing not more than $1\frac{3}{4}$ oz. were included in the export shipments. These in some cases realized on the London market at least 6d. a dozen less than did the packs containing 2 oz. eggs or slightly over. Notwithstanding this difference in price, under the present crude pool system adopted, the small-egg producer received a return according to count equal to that of the producer of the higher-priced superior article. On the London market New Zealand eggs, as is the case with those from other countries, are sold according to their weight per long hundred

(120). Obviously, if the production of small eggs is to be discouraged, all eggs intended for export should be paid for at this end according to their weight, instead of by the count as in the past. In my opinion no egg should be exported which is not bordering on 2 oz., or, in other words, uniform-sized eggs that will make a minimum pack of 15 lb. per long hundred. The initial shipments that made the good name and built up the high reputation for New Zealand eggs conformed to that standard. I can imagine no shorter cut towards losing that reputation than by shipping undersized eggs. The following extract from a recent trade report received regarding some of last season's shipments will help to bear out this contention: "A number of eggs have been received below the standard grade of 15 lb. per long hundred (10 dozen). The 15 lb. packs and over did fairly well, but the weights below these would show a loss. Unless it is for the purpose of unloading a surplus in New Zealand it would appear as if shippers should make 15 lb. the minimum." The foregoing, together with the fact that all that can be expected of our export trade in the near future is to unload any available small summer surplus for the maintenance of paying local values, is sufficient to indicate that no undersized egg should be exported.

With reference to the 15 lb. pack or over so much desired on the London market, it must not be inferred that this should be made up with eggs of various sizes. It is obvious that the eggs should be graded to be as nearly alike as possible regarding size, for the reason that a uniform pack is easily valued by a prospective buyer, while a mixed line proves troublesome. The great incentive in marketing any high-grade food-commodity is that it commands the high-class trade, which demands the best and is prepared to pay its full market value in return. Especially is the question of quality of paramount importance when catering for an oversea trade in these days of keen competition. It is to be regretted that so many poultry-keepers have bred for numbers of eggs quite irrespective of their size, and rather than endeavour to correct this tendency by careful breeding and selection they urge that an undergrade egg should be exported, meaning, as it will, if continued, the losing of a good name which may prove difficult to regain.

—F. C. Brown, Chief Poultry Instructor.

THE APIARY.

THE SPRING INSPECTION.

WHENEVER the temperature will allow, advantage may be taken of fine spring days to give the colonies their first inspection of the season. It is highly important that this work should be undertaken early in August, and not postponed until brood-rearing has commenced in earnest. By this time small patches of brood will be found, and under favourable conditions the quantity will rapidly increase, but just in proportion to the amount of food available so will brood-rearing proceed. On no account should the examination be post-poned indefinitely if it can be avoided, or in all probability losses will be recorded through starvation. During the dormant season the drain on the stores is small, but once the activities of the hive

commence no effort should be spared to see that each individual colony has sufficient food to meet current demands. Colonies containing at this season 15 lb. to 20 lb. of honey may be left undisturbed for some weeks, but failing this amount preparation should be made for feeding. (See Bulletin No. 55, p. 37, "Spring Feeding of Bees.")

Supers: In order to facilitate brood-rearing, supers left on during the winter months may now be removed and the bees confined to the brood-chamber. In cases where bees are found in the super, remove the deserted brood-combs and place the super containing the bees on the bottom-board. Make all the hives snug, and provide each with one or two extra mats. These will help to conserve the heat of the hive.

Queen-right colonies: As indicated, an important matter in connection with the first examination of colonies is to note the extent of brood-rearing in progress. This will largely determine whether the colony has a laying-queen. Do not hastily conclude that a colony is queenless if brood is not visible, as much depends on the locality and weather conditions preceding the examination. If the colony is strong and normal the question of queenlessness may be postponed until a later date. Make a note of each hive and its condition for future reference.

APIARY RECORDS.

At every examination the beekeeper should make a record of the condition of his hives with regard to stores, brood, health, and fertility of queen. These records are invaluable, and enable one to proceed about his work systematically. Where time and labour are considerations, notes made at the time of inspection will save confusion and endless trouble. A pencil note on the inside of the cover or on a piece of section, and placed under the roof, is handy for reference if by any chance the notebook be mislaid.

PREPARATION FOR THE NEW SEASON.

The beekeeper should, as far as possible, utilize his spare time in making preparation for the coming season. Generally there is a good deal of work which can be undertaken now. Push on with hive and frame making if increase has been decided upon, and with the overhauling of any faulty supers, roofs, and bottom-boards. Usually when the bees are absorbing the greater part of the beekeeper's attention he will find very little time to attend to the mechanical part of the work. Do not postpone ordering supplies. Beekeepers who are not skilled with tools will find it more profitable to purchase their hives from the manufacturers. The machine-made hives can be depended upon, as they have been brought to a high standard of perfection.

When purchasing new supplies aim at uniformity. Do not be tempted to purchase job lines of bee material because dealers have represented the lines to be cheap. Standardize your hives, and endeavour each season as far as possible to dispense with badly fitting supers, &c. Nothing is more tantalizing than to find that supers will not fit the bottom-boards, or that roofs are an inch or so too long. One cannot afford to neglect his working-plant. Good standard hives are among the essentials that lead to profitable management.

FRAME MAKING AND WIRING.

A great deal of time must necessarily be spent performing this very important part of the work. The assembling of brood-frames and extracting-frames should receive every consideration. There are many plans for curtailing the labour involved, but, whatever method is adopted, strict attention must be given to proper nailing. Neglect to secure frames properly will lead to endless worry when the frames are in use. In districts where the bees gather propolis in large quantities too great caution cannot be exercised in nailing. It is not sufficient to drive a nail down through the top bar into the end bar. Too often the top bar will come away and leave the end bars jammed by the pressure of the other frames and adhering propolis. To guard against this trouble, the end bars should be nailed to the top bar by driving two nails through the end bars parallel with and into the top bar. This will secure the frame and prevent it from breaking when in use. On no account dispense with wiring the frames if the combs are to be extracted. Good wiring will enable the beekeeper to handle his combs freely, and even on very hot days there is no risk of their falling from the frames, as is the case when wiring is not adopted. When using full sheets of foundation it is a distinct advantage to employ wire. This holds the foundation in position, and good straight combs are produced. See that the wires are tight and securely fastened. Cut the wire into lengths of about 60 in., and bind in the centre; the strands can then be pulled out as required.

—E. A. Earp, Senior Apiary Instructor.

HORTICULTURE.

VEGETABLE-GROWING.

WORK among the vegetable crops, detailed in last month's notes, will have been carried out in the warmer districts; elsewhere the right conditions may now soon be expected, and they should be accepted without delay. Following this, the preparation of land for the main potato and root crops will demand attention, as well as that for tomatoes and the less hardy crops to be planted later. For this purpose land carrying winter and spring crops of cabbage, cauliflower, broccoli, and lettuce will gradually become available, and should be taken in hand right away. Early and good cultivation, and the sprouting and destruction of the weed-seeds in reach of the surface, by way of preparation, will greatly facilitate the growing of those crops.

For the more permanent crops such as rhubarb and asparagus, where new plantings are to be made, a more elaborate preparation is necessary. Heavy dressings of stable and green manure should be made, and in most cases the preparation would be all the better were the subsoil broken up. Where a good deep sandy loam or drained swamp land is available these crops should be planted in larger areas. Established beds of rhubarb should now receive a good dressing of superphosphate and organic manure.

Where kumaras are to be grown, start the tubers now for a supply of rooted shoots.

TOMATOES.

Growers of tomato crops outside will be sowing the seed now; over-rich soil in the seed-box is to be avoided. Make sure of getting a good strain of seed of a variety suitable for your land. Considerable loss and disappointment is experienced annually through omitting this precaution. Crops to be grown under glass are usually planted out towards the end of August. In preparation for this grow sturdy, thrifty plants by giving them plenty of sunshine and air. A big soft plant grown in moisture and heat in a rich soil is not likely to bear the early crop that is the more valuable. Avoid nitrogenous manures at this stage, and see that the land does not lack a sufficiency of lime. Water the plants before setting them out, and spray them with bordeaux if at all necessary. Inspect each plant closely before planting. Discard all that are blind, weak, or untrue to type, and plant in a firm bed.

SMALL-FRUITS.

The planting of gooseberries, currants, raspberries, loganberries, and strawberries should be completed now. Plantations in bearing should receive a dressing of nitrate of soda or sulphate of ammonia as soon as the fruit has set. Prepare the land for Cape gooseberries and passion-vines. Spray strawberry-plants with bordeaux for the prevention of leaf-spot.

TOBACCO-GROWING.

The first tobacco seed-beds are sown down during the month of August; in preparation the soil may now be sterilized by burning. Select a good free loam, well drained and in a warm locality. After sowing, protect the beds from frost and drying-out by shading with a hessian cover. At the same time proceed with the preparation of the land for planting out the crop. It should be deep and thorough. A dressing of 4 cwt. or 5 cwt. of lime would suit most soils, and, if at all sour, it can be increased to ½ ton or more with advantage. Destroy the weeds in fine weather as they germinate; it is easier done now than later when the crop is planted out.

GARDEN PESTS.

The depredations of wood-lice, slugs, snails, wireworms, and cut-worms are the cause of considerable inquiry at this season. Until more effectual natural enemies are found the war will have to be waged from year to year by other means.

For the destruction of slugs and snails, fresh air-slaked lime is a powerful agent. Apply it after sunset or before sunrise when the pests are feeding. Cheap and convenient mechanical dusters of new design are now available. They are quick and effective, and dispose of all the unpleasantness experienced when one has to broadcast the lime. It is well to remember that bluestone is also effective in this connection. Applied to plants as a Bordeaux or Burgundy mixture it might well suit a twofold purpose. Nitrate of soda is another remedy, and applied to a crop of lettuce, cabbage, or cauliflower in early spring it will serve a twofold purpose of another kind. The lime and nitrate are also useful in countering the attack of wireworms.

Wood-lice are readily destroyed when secreted in their daytime resorts by the old-fashioned method of applying hot water, but quite often they cannot be reached in this way. The Cheshunt Research

Station publish the following remedy, which should have a wider usefulness: Oatmeal, 50 parts; potassium bichromate, 1; glucose, 2; and water, 30 parts. The potassium should be dissolved in water before adding it to the other ingredients.

For both cutworms and wood-lice the following recipe is worth a trial: Paris green, ¼ lb.; bran or pollard, 1 peck; molasses, 1 pint; water, 4 to 6 quarts. Mix the two dry ingredients thoroughly, and in another vessel the molasses and water. Add the liquid to the first mixture slowly, stir, and allow to stand for several hours. Scatter thinly between the rows of plants after sunset. It would be interesting also to try powdered arsenate of lead, which is more generally available, in the place of Paris green.

PLANTING OF TREES AND SHRUBS.

We are now getting toward the end of the season for planting out trees and shrubs. Where such work has to be done it should now take precedence over all other work in fine weather.

—*W. C. Hyde, Horticulturist.*

INVENTIONS OF AGRICULTURAL INTEREST.

APPLICATIONS for patents, published with abridged specifications in the *New Zealand Patent Office Journal* from 7th May to 2nd July, 1925, include the following of agricultural interest:—

No. 51926: Milk-sediment tester; E. C. Alexander, Wellington. No. 52348: Seed-hulling apparatus; F. S. Hill, Cobden, Victoria. No. 53295: Poison-gas generator for rabbit-destruction; C. A. Mulholland, Northwood, N.S.W. No. 53681: Concrete-post mould; E. Andersen, Midhirst. Nos. 52069 and 52070: Cheese-crate-head-cutting machine, and forming; G. Osborne, Mataura. No. 53748: Cream-separator; D. Cuthbert, Birkenhead. No. 51745: Milking-machine teat-cup; C. F. Claasen, Rawene. No. 52087: Milk and cream pasteurizer temperature-control; L. Hansen, Christchurch. No. 52237: Milking-machine teat-cup-cleansing device; T. Shiels, Invercargill. No. 53419: Plant-growth enhancing; C. F. Eckhart, Honolulu, Hawaii. No. 52369: Milk-strainer; E. A. Amos, Matamata. No. 53393: Brooder; A. J. H. Beduhn, Prenzlau, Queensland. No. 53407: Cream-testing process; Pfandler Company, Rochester, U.S.A. No. 53824: Animal-leg rope; E. F. Murphy, Ngaruawahia. No. 53836: Grain- and seed-sorting machine; Douglas and Grant, Ltd., Kirkcaldy, Scotland. No. 53881: Insect-pests destruction; A. M. Kobiolke, Gilderoy, Victoria. No. 52821: Chicken-brooder; S. D. Rogers, Upper Hutt. No. 53703: Wire-fencing dropper; G. E. Cluett, Auckland. No. 53815: Wire-strainer; T. Crawford, Walsall, England. No. 53957: Milking-machine teat-cup support; T. B. Crawshaw, jun., Christchurch. No. 54040: Crop-drying in stack; B. J. Owen, Institute of Agricultural Engineering, Oxford, England. No. 54161: Cheese-press hoop; Wilkins Ltd., Invercargill.

Copy of full specifications and drawings in respect of any of the above may be obtained from the Registrar of Patents, Wellington. Price, 1s.

Instructional Services of Agriculture Department.—The Governor-General's speech at the opening of Parliament last month contained the following passage: "My Ministers realize that the development of our primary industries demands an extension of the instructional services of the Department of Agriculture. It is proposed to increase the trained staff of the Department in order that information and advice may be provided directly to producers through the medium of trained instructors stationed at various suitable centres throughout the Dominion. The existing services of the Department have already been the means of rendering material aid to producers, and provide a basis upon which a wider and more comprehensive service can be established."

WEATHER RECORDS: JUNE, 1925.

Dominion Meteorological Office.

GENERAL SUMMARY.

THE weather of the month of June was dominated by conditions similar to those of May. There was again a remarkable prevalence of ex-tropical disturbances, chiefly affecting the North Island and north-eastern districts of the South. Under these circumstances the western and southern districts of the South Island had, on the whole, more pleasant winter weather than other parts of the Dominion.

The month opened with stormy weather and high south-easterly winds, and unsettled conditions continued, especially in the North, until the 13th, when a severe disturbance passed to the eastward, bringing cold and heavy southerly weather along the east coast. Both the front and rear of a disturbance ruling from the 23rd to the 26th accounted for some heavy rains and high winds. The month closed with trying easterly winds and heavy rains in the northern and east-coast districts. There was also considerable snow in the South.

Returns so far to hand show that rainfall was below the average in South Canterbury, Westland, and Otago, but greatly in excess in most parts of the North Island, and on the higher levels of Canterbury and in Christchurch City.

Barometric pressure was highest between the 11th and 22nd, when many parts experienced fine weather by day and cold and frosty nights. Frosts appear to have been more numerous and severe than are commonly experienced in June.

There were three hard southerlies on the east coast. Some parts of the country reported less wind than usual, but this does not appear to have been the general experience.

—*D. C. Bates, Director.*

RAINFALL FOR JUNE, 1925, AT REPRESENTATIVE STATIONS.

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average June Rainfall.
North Island.				
	Inches.		Inches.	Inches.
Kaitaia	7·80	20	1·23	5·53
Russell	13·36	22	6·60	6·28
Whangarei	13·12	23	3·30	5·26
Auckland	7·85	21	1·86	4·79
Hamilton	8·17	17	2·02	5·07
Kawhia	8·01	16	1·94	5·46
New Plymouth	6·64	17	1·38	6·21
Riversdale, Inglewood	12·16	21	2·56	10·31
Whangamomona	6·65	13	1·62	7·92
Tairua, Thames	11·18	16	3·16	6·95
Tauranga	15·01	15	6·02	5·05
Maraehako Station, Opotiki ..	7·30	14	1·56	5·68
Gisborne	9·69	25	1·81	5·21
Taupo	10·54	13	2·30	4·35
Napier	6·57	23	1·11	2·45
Maraekakaho Station, Hastings ..	8·92	23	1·31	3·33
Taihape	4·46	21	0·60	3·79
Masterton	7·39	22	1·41	3·41
Patea	5·05	20	0·91	4·40
Wanganui	2·20	8	0·58	3·29
Foxton	3·28	11	0·72	2·83
Wellington	8·33	21	1·13	4·85
South Island.				
Westport	2·69	13	0·64	7·53
Greymouth	4·62	11	1·46	8·99
Hokitika	6·07	13	2·42	9·72
Arthur's Pass	12·59	7	4·53	9·77
Okuru, Westland	4·82	6	1·42	10·76

RAINFALL FOR JUNE, 1925—*continued.*

Station.	Total Fall.	Number of Wet Days.	Maximum Fall.	Average June Rainfall.
South Island—continued.				
	Inches.		Inches.	Inches.
Collingwood	10·58	12	3·92	11·33
Nelson	3·68	11	1·35	3·75
Spring Creek, Blenheim	4·97	12	1·35	3·23
Tophouse	3·97	11	0·97	4·99
Hanmer Springs	8·21	15	1·75	2·83
Highfield, Waiau	6·06	15	1·00	2·50
Gore Bay	6·34	16	1·80	2·30
Christchurch	4·32	21	0·63	2·64
Timaru	1·32	12	0·40	1·84
Lambrook Station, Fairlie ..	..	..	..	2·06
Benmore Station, Omarama ..	1·03	7	0·30	2·06
Oamaru	1·52	11	0·35	2·11
Queenstown	1·13	4	0·62	2·41
Clyde	0·34	3	0·20	0·98
Dunedin	2·97	14	0·55	3·13
Gore	1·50	14	0·32	2·76
Invercargill	2·03	12	0·48	3·54

PARCHMENT PAPER FOR EXPORT BUTTER.

REPORTS from various sources in Britain, including the Department's Inspector of Dairy-produce in London, were received on several occasions during the past season commenting unfavourably on some of the parchment paper used in the packing of New Zealand butter. In a number of instances the paper was found to be brittle, and broke into pieces when being removed from the butter. In other cases the paper was thin and did not afford the butter the amount of protection from the odour of the timber of the boxes which thicker paper would have done, and this was particularly noticeable with butters which had been held in cold storage for prolonged periods. To obviate these defects it is recommended that only the best-quality parchment paper, of a weight of not less than 28 lb. to 30 lb. per ream, be used, and, as is customary, of two thicknesses. If paper of lighter weight is used the wrapping should consist of three thicknesses.

BOOKS RECEIVED.

"THE CULTURE OF LUCERNE," by W. S. Hill, B.Agr. (N.Z.), Instructor in Agriculture, Seddon Memorial Technical College, Auckland; 268 pages; illustrated; price, 6s. 6d.; Whitcombe and Tombs, Ltd., Wellington, &c. Lately issued volume of the "New Zealand Practical Handbooks" series.

"ANIMAL GENETICS: AN INTRODUCTION TO THE SCIENCE OF ANIMAL BREEDING," by F. A. E. Crew, D.Sc., &c., Lecturer in Genetics in the University of Edinburgh, and Director of the Animal Breeding Research Department; 420 pages; illustrated; price, 15s. net; Oliver and Boyd, Edinburgh and London.

"THE PIG BREEDERS' ANNUAL," 1925; 152 pages; illustrated; price, 2s. 6d.; published by the National Pig Breeders' Association (England), 92 Gower Street, London.

"NEW ZEALAND TO-DAY." An accredited illustrated description of the Dominion's industries, commerce, resources, scenery, sport, &c., produced by Vivian E. Page, Dunedin (publisher of "Progressive New Zealand," 1924), and edited by L. S. Fanning. New Zealand and South Seas International Exhibition (Dunedin) edition.

ANSWERS TO INQUIRIES.

IN order to ensure reply to questions, correspondents must give their name and address, not necessarily for publication, but as a guarantee of good faith Letters should be addressed to the Editor.

ABORTION IN COWS.

A. K., South Makirikiri :—

Would you kindly explain the difference, if any, between contagious abortion in cows and cows slipping their calves ?

The Live-stock Division :—

"Contagious abortion" indicates a specific disease of cattle caused by a germ termed *Bacillus abortus*. "Slipping calves" indicates no more than a premature birth or a sporadic abortion from any cause whatsoever, but the term is generally used to refer to contagious abortion. In contagious abortion a series of abortions occur one after another in the affected herd. The abortion typically occurs about the sixth or seventh month, but may take place at any stage of gestation from service to parturition. In sporadic abortion one finds a single isolated case of a cow slipping her calf—at any period of gestation—from some accidental cause, such as injury, overdriving, lymphany, &c. In contagious abortion the placenta ("cleansing") is often retained for several days, and the cotyledons ("roses") have a characteristic yellowish-brown rotten appearance; also there is a considerable discharge of thick chocolate-coloured material from the vagina. In the sporadic type the placenta is healthy-looking and normal in appearance, and characteristically comes away at the time of or shortly after the act of abortion. As regards treatment after a sporadic abortion, all that is necessary is to syringe out the genital passage with a mild antiseptic solution—for example, perchloride of mercury, 1 part; water, 3,000 parts. The treatment of contagious abortion is dealt with in the Department's Bulletin 93, "Abortion Disease in Dairy Herds," a copy of which has been sent to you.

CONTROL OF GRAIN-WEAVILS.

J. V. WYATT, Leigh :—

Please advise the best way to get rid of grain-weavils. My shed has been badly infested for several years, and the weavils seem to increase rapidly in loose oaten chaff.

The Fields Division :—

The control of grain-weavils can be carried out satisfactorily and economically only where an airtight fumigating-chamber is available, and any one regularly storing quantities of grain or chaff should have such an appliance as part of the store. The size of such a chamber would vary according to the amount of material handled, though a great deal can be treated by several fumigations in a comparatively small chamber. An effective chamber can be constructed of wood, with the outside walls of storm-boarding, and the inner walls and floor of tongued-and-grooved timber, which also covers the roof, the latter being overlaid with ruberoid. The whole inside finally is enamelled. The door must be quite airtight when closed, and it is advisable to have an opening closed by an airtight door on the back and side walls for ventilating purposes after fumigation. Both doors and ventilators should open outwards. The chamber should be raised on piles off the ground. Considerable quantities of material could be treated in a chamber of 1,000 cub. ft. air-space. The safest fumigant to use is carbon bisulphide, and in an airtight chamber such as described 5 lb. of bisulphide to 1,000 cub. ft. of air-space would be effective. The length of time required for fumigation varies with the temperature, and the best results are secured at a temperature of 70° F. or over, the chamber being kept closed for twenty-four hours. The lower the temperature, however, the less readily does the bisulphide volatilize, and the time required becomes longer. Where a comparatively small quantity of material is to be fumigated it can be placed in a barrel, 1 oz. bisulphide to every

100 lb. of material poured on to the material, and the mouth of the barrel tightly closed for forty-eight hours. If more than one barrel is used a considerable quantity of material can be so treated. The carbon-bisulphide fumes are heavy, and the fumigant should be placed in shallow vessels (benzine-tins cut down) high up in the chamber. As this fumigant is inflammable no lights of any sort whatsoever should be in the vicinity during fumigation.

CHAFF AND MANGOLD RATION FOR BREEDING-EWES.

J. Cox, Eiffelton :—

I am feeding breeding-ewes with cocksfoot-straw chaff—five sacks to 4 bushels Algerian oats—with mangolds. Could you advise me in what proportion to feed same to obtain best results ?

The Live-stock Division :—

In determining the proportions of the ingredients mentioned by you, consideration must be given to the condition of the sheep and the conditions under which they are living before a definite ration can be laid down. For sheep living under average conditions the quantity necessary is between 3 and 4 tons of mangolds and 600 lb. to 1,000 lb. of chaff mixture per week for each hundred sheep. If the weather continues to be wet and cold it would be advisable to give the sheep as much chaff mixture as they will eat, and supply mangolds in the proportion stated. This diet is deficient in protein for anything but holding sheep, but it will suit ewes in lamb quite well. From 30 lb. to 40 lb. of whole or split peas to the diet as the ewes get near lambing would be an improvement. The ewes should also be given plenty of exercise. The proportion in which you are mixing the cocksfoot chaff and Algerian oats is quite suitable.

MANURING BLACK CURRANTS.

"Inquirer," Havelock North :—

I propose manuring about ¾ acre of black currants on heavy soil. Would you please advise me when is the best time to do it ; also the best manure to use, and how much ?

The Horticulture Division :—

For manuring your black currants you are recommended to try a mixture of 3 cwt. superphosphate and 1½ cwt. sulphate of potash, applying it towards the end of July. When the fruit has set apply 1½ cwt. nitrate of soda.

CLEARING AND GRASSING MANUKA HILL COUNTRY.

"Manuka," Uruti :—

I have just had cut a considerable amount of manuka, both big and small. It was growing in some gullies and on easy faces, lying fairly well to the morning sun but a bit shady in the afternoon. The country is mostly blue papa. In most places under the manuka there is a growth of hard fern. I would like to have advice as to when to burn, and what would be the most useful mixture of grass-seeds to put on the burns.

The Fields Division :—

As you have the scrub cut it will be advisable to get a burn in the spring, for if left until autumn the seeding manuka will probably nullify your chances of a good burn. When the fallen manuka will be ready must, of course, be dependent upon the weather, but it should be fit to take a good fire by August. Failing this you will have to let it wait until the autumn and chance a good burn. The grass-seed should be sown as soon as possible after the fire has died out, so as to make the best of the ash seed-bed. A suitable mixture would be as follows: Cocksfoot, 3 lb ; crested dogstail, 3 lb. ; perennial rye-grass, 8 lb. ; brown-top, 2 lb. ; Danthonia pilosa, 3 lb. ; Lotus major, 1 lb. ; white clover, 1 lb. ; subterranean clover, ¼ lb.

CONCENTRATES FOR DAIRY COWS.

C. N. RUSSELL, Matamau :—

Kindly let me know if there is any great benefit derived from feeding concentrates, such as bran, linseed, nuts, &c., to the average dairy herd during the milking season, and, if so, the necessary amount to give.

The Live-stock Division :—

During the season when green feed is normally plentiful, and provided shelter is available, such concentrated foods should be unnecessary. During the later part of the milking-period, however, and particularly in the case of heavy milkers, a supplementary ration may be given with advantage with the view of replacing the salts lost during the season, and giving the cows a start for the next lactation. Amounts of 2 lb. bran and 2 lb. nuts or linseed-meal would be a suitable addition to the feed, and a handful of salt might be added with advantage.

GROWING OF EARLY LETTUCE.

O. E. CLARK, Christchurch :—

I would like advice regarding the growing of hothouse lettuce for early market. Would you kindly inform me as to treatment of the soil, manuring the crop, and dealing with any diseases?

The Horticulture Division :—

In the warmer parts of the country lettuce is readily grown outside all the year round. However, should your land be exposed to cold weather, a cold frame or unheated glasshouse would best suit the purpose. The soil should be well manured and deeply cultivated, using well-decayed stable manure and about 3 cwt. superphosphate per acre. When the plants have commenced to make growth apply a dressing of nitrate of soda. Slugs often trouble the young plants in spring. A remedy is to dust the plants with slaked lime during the evening or early morning.

PREVENTION OF EARLY BLIGHT IN POTATOES.

C. H. B., Pukekohe :—

Could you inform me as to the best method of preventing rust appearing in potato crops? The haulms die down in patches a month or six weeks before maturity. The tubers are undersized, but not otherwise affected. Would a dressing of sulphate of iron be beneficial, and would basic slag have the same effect as sulphate of iron?

The Fields Division :—

The Department's Mycologist suggests that the disease referred to as "rust" was probably that known as early blight. As a means of prevention, anything you may do in the way of better cultivation, better drainage, and better feeding of the crop will bring about increased vitality, and therefore make it more resistant to the attack of fungous diseases. Sulphate of iron is sometimes used for the control of diseases in potato crops. A dressing of ground sulphate, which is a green salt, is applied to the soil about a week before sowing the crop. It can be applied in a similar manner to the ordinary fertilizer, but it is desirable to apply them separately, especially if superphosphate is in the potato manurial mixture. Use the sulphate of iron at the rate of 1 cwt. per acre. Sulphate of iron is regarded as a fungicide, and probably its value is due to this fact. Basic slag would certainly not have the same effect as sulphate of iron. It would, however, supply phosphate, and would help in increasing the vigour and yield of the crop. Regarding the potato manurial mixture the following is advised: Superphosphate, 5 parts; bonedust, 3 parts; sulphate of potash, 2 parts. Use 6 cwt. to 10 cwt. of the mixture per acre. Even up to 16 cwt. and 20 cwt. per acre may be used with profit, especially for the early potato crop.

UNIFORMITY IN GRADING OF BUTTER AND CHEESE.

THE necessity for uniformity in the grading of butter and cheese at the various grading-ports has been recognized since the inception of that service by the Department of Agriculture. Up to the present many factors have contributed to uniformity in this work, among which may be indicated—

(1.) The fact that when Graders are appointed they are selected from a class of efficient, successful factory-managers, already conversant with the standards used in grading butter and cheese.

(2.) The training of new appointees while working in the capacity of assistant graders.

(3.) Conferences of Graders at selected grading-ports.

(4.) The assembling of Graders and Instructors from various districts in connection with the work of judging the large exhibits of butter and cheese at the various winter shows.

(5.) Visits to the several grading-ports, as time permits, during the season, by the Assistant Director or Director of the Dairy Division.

These factors have been instrumental in maintaining a very satisfactory degree of uniformity in the past. The general expansion of the work under the control of the Dairy Division is, however, making it increasingly difficult for the Assistant Director and Director to visit grading-ports as often as desirable. In view, therefore, of the necessity of maintaining the greatest uniformity possible, it has been arranged that during the ensuing season Mr. J. O'Dea, Grader in charge, Wellington, will, at intervals, visit North Island grading-ports; and that Mr. Clayton, Grader in charge at Lyttelton, will pay similar visits to South Island ports. The fact that these officers will be working in the capacity of supervising Graders should give even greater assurance to dairy companies and factory-managers that the grading will be kept uniform throughout the grading-ports.

—W. M. Singleton, Director of the Dairy Division.

IMPORTATION OF PEDIGREE STOCK INTO GREAT BRITAIN.

A MOVEMENT was initiated some time ago to obtain such relaxation of the British regulations as would enable the importation, under reasonable safeguards, of pedigree stock into Great Britain from British overseas countries. The matter was discussed at the last Imperial Conference, and certain provisions in this respect were agreed to. A Bill on the lines of this agreement was subsequently introduced into the Imperial Parliament "to amend the law with respect to the landing in Great Britain of pedigree animals brought from His Majesty's dominions." The stock specified were cattle, sheep, goats, and swine. Official advice was received last month that the Bill as introduced had been passed without modification, except the addition of a provision requiring consultation with the Royal Agricultural Society of England and Ireland, and the Agricultural Society of Scotland, before a Ministerial order is made allowing the landing of any stock covered by the measure. The "Importation of Pedigree Animals Act, 1925," as the measure is entitled, enables the landing of stock under such conditions as will make exportations from New Zealand to Great Britain practicable. Intending shippers should, of course, make themselves familiar with the conditions and other details of the Act. Pending the receipt of copies of the latter, the original Bill may be seen by any person concerned at the Head Office of the Agriculture Department, Wellington.

Tree-planting.—During the year 1924–25 a total of 2,930,564 young trees was disposed of by the State Forest Service to farmer-settlers, local bodies, and proprietary companies, as compared with 1,839,512 in the preceding year.

DAIRY FACTORIES IN NEW ZEALAND, 1925.

THE following table presents the registrations of factories under the Dairy Industry Act as at 30th April last, together with the quantities of butter and cheese forwarded to grading-stores for export during the year ended 31st March, 1925, and the numbers of milk or cream suppliers to the factories :—

District.	Number of Factories.				Forwarded for Export, 1924–25.		Number of Suppliers to Factories.	
	Butter.	Cheese.	Dual Plant.	Total.	Butter.	Cheese.	Butter.	Cheese and Dual Plant.
					Tons.	Tons.		
Auckland ..	65	32	5	102	41,062	9,370	16,612	913
Taranaki ..	19	71	38	128	9,388	32,970	2,982	3,398
Wellington ..	17	50	12	79	8,858	12,418	4,574	1,729
Hawke's Bay ..	11	15	4	30	3,786	3,568	3,687	690
Nelson	5	4	1	10	1,164	441	939	485
Marlborough ..	4	4	3	11	789	821	660	304
Westland ..	10	..	1	11	675	100	904	32
Canterbury ..	10	13	4	27	2,787	1,616	5,997	1,526
Otago and Southland	15	78	1	94	2,554	10,712	6,968	2,724
Totals, 1925 ..	156	267	69	492	71,063	72,016	43,323	11,801
Totals, 1924 ..	156	295	64	515	57,818	71,255	41,704	12,296

In the 1924–25 period there were also operating in the Dominion five milk-powder factories (two whole-milk and three skim-milk plants), five casein-factories, one condensed-milk factory, and one sugar-of-milk factory.

VARIETIES OF APPLES EXPORTED IN 1925 SEASON.

THE following particulars of the varieties of apples exported from New Zealand to Britain, South America, Hawaii, and British Columbia in the 1925 season have been compiled from Orchard Instructors' reports, the figures representing the number of 1-bushel cases shipped :—

Sturmer, 68,092 ; Jonathan, 59,011 ; Delicious, 21,954 ; Dunn's, 18,131 ; Dougherty, 14,802 ; Cox's Orange, 7,932 ; Statesman, 7,776 ; Rome Beauty, 5,657 ; London Pippin, 4,874 ; Scarlet Nonpareil, 3,111 ; Cleopatra, 2,588 ; Newtown Pippin, 2,417 ; Rokewood, 2,050 ; Premier, 1,798 ; Worcester Pearmain, 1,660 ; King David, 1,455 ; Lord Wolseley, 1,416 ; Adams Pearmain, 1,290 ; Pioneer, 780 ; Tasma, 616 ; Spitzenberg, 587 ; Hoover, 581 ; Stark, 374 ; Washington, 320 ; Frimley Beauty, 295 ; Shoreland Queen, 292 ; Ballarat, 292 ; Edward Lippiatt 250 ; Yates, 230 ; Salome, 222 ; Rona, 218 ; Stayman, 211 ; Scarlet Pearmain, 194 ; Willie Sharp, 155 ; Crofton, 150 ; Tasma's Pride, 150 ; Brownlee's Russet, 140 ; Ribston Pippin, 125 ; Brighton, 110 ; Granny Smith, 96 ; Beaumann's Reinette, 86 ; Rymer, 73 ; Shepherd's Perfection, 73 ; Boston Russet, 47 ; Senator, 32 ; Allington Pippin, 20 ; McMahon's White, 19 ; Commerce, 6 ; Kentucky Redstreak, 3 : total, 232,761.

London Market for Peas and Beans.—The following advice was cabled by the High Commissioner on 4th July : *Peas*—Maple partridge, very little demand for spot or for shipments ; New Zealand ex store offered at 67s. 6d. to 72s. 6d. ; Tasmanian, 75s. to 82s 6d. ; No. 1 New Zealand, sale reported at 68s. c.i.f. ; "A" Tasmanian quoted at 70s. to 73s. 6d. c.i.f. Blue, fair demand for Japanese and Dutch continues. Japanese green have been sold at £22 15s. per ton, May or June shipments. English crop yield expected to be light on account of dry weather. *Beans*—Very little business has been done. English spring offered up to 54s., winter 48s. New crop Chinese horse, July–September shipments, offered £10 7s. 6d. without finding buyers.